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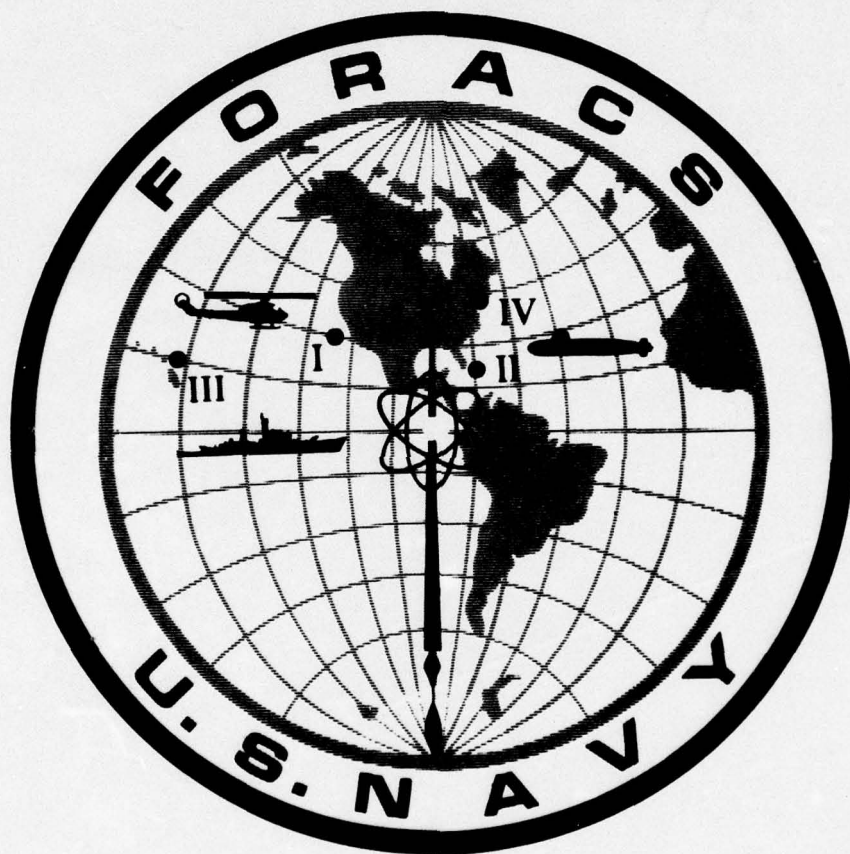
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FORACS DATA BANK MANUAL



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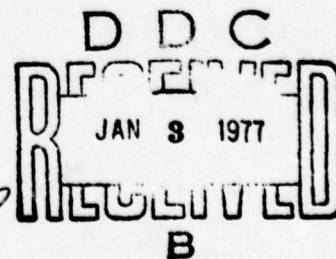
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PREFACE

Material contained in this publication was prepared by members of FORACS Operational Support Division of the Naval Electronics Laboratory Center under program element 60000N, project SEA, task area OMN and NELC work unit R112. This document was approved for publication on 15 October 1976. PC

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INTRODUCTION

The Fleet Operational Readiness Accuracy Check Site (FORACS) program was established to determine the range and/or bearing accuracy of various ship sensors: gyrocompass, sonar, gun fire-control system, surface-search radar, pelorus, and periscope. FORACS ranges currently in operation are located at San Clemente Island, California, St. Croix, Virgin Islands, Oahu, Hawaii, Fishers Island, New York, and Andros Island in the Bahamas. These ranges collect sensor information and report results to the ship and others in the Navy community.

Test data come to NELC in the form of magnetic tape, computer listings, and bound reports. At NELC the incoming data are reprocessed and retrieval programs allow these data to be extracted in a variety of computer sorts. Special reports can be generated with the addition of minimum amounts of new software. Summary information is published at regular intervals to give an updated history of sensor performance.

NELC FORACS TAPE LIBRARY

Information for the NELC FORACS tape library is submitted by the ranges in the forms shown in table 1. After checking, this information is entered into the NELC computer and is maintained in mark-by-mark, interval, and summary files in the data bank (figure 1). Mark-by-mark files consist of all individual bearing and range errors for each sensor tested. Interval files consist of bearing- and range-error parameters for bearing sectors and range intervals. Summary files consist of statistical parameters computed for each sensor and are used for producing summary reports.

Once the range data have been checked for accuracy, the three files are merged into the library for permanent storage. Thus, the files are being continually expanded as additional ship tests are performed. Programs are available in the NELC computer to edit the files should erroneous information be discovered in them or if it becomes necessary to change any particular file.

Data may be retrieved from the files by equipment type, ship name, ship class, FORACS range number, or other desired parameters. As data are extracted in this manner, they are merged on a scratch tape for ease in providing answers to special queries.

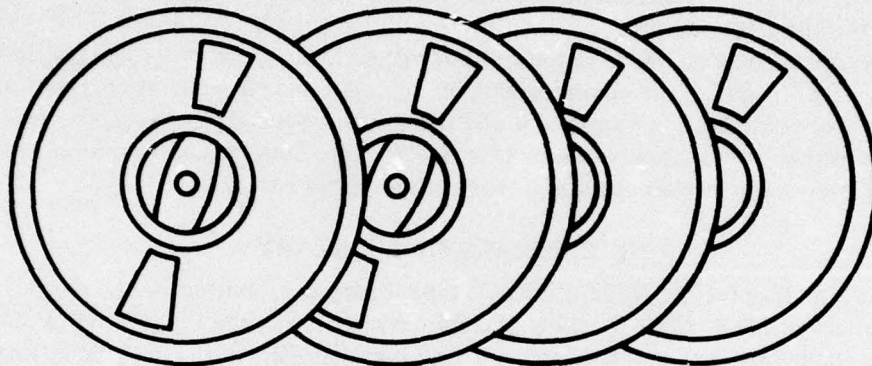
TABLE 1. MATERIAL REQUIRED FROM RANGES.

Bound volume of the test report
Computer listings from programs DAY, ED, NORM, GSE, and PERCAL (for submarines)
Magnetic tapes containing data from the programs NORM, ED, GSE, and PERCAL (for submarines)

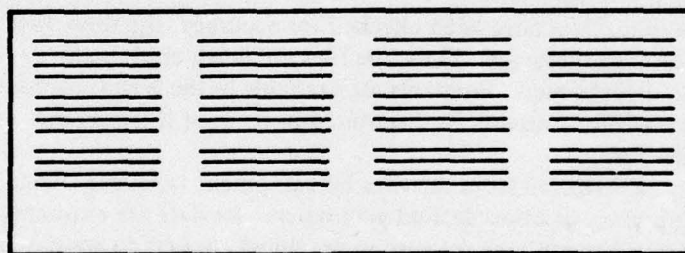
NELC FORACS DATA BANK FIELD LAYOUT

The NELC FORACS data bank makes use of the fields shown in figure 2. The following is a discussion and description of these fields.

(MARK BY MARK)



(INTERVAL)



(SUMMARIZED)

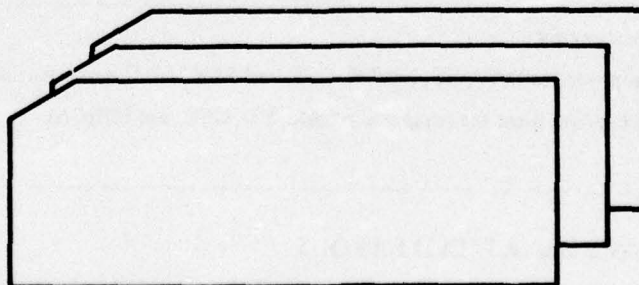


Figure 1. FORACS data bank.

EDIT CODE

If the edit-code field is left blank it indicates that both range and bearing errors are valid; if a '1' is placed in this field, the range error is valid and the bearing error is not valid or has not been taken; if a '2' appears in this field, the bearing error is valid and the range error is not valid or has not been taken; and if a '3' appears in this field neither range nor bearing errors are valid.

MARK NUMBERS

Mark numbers may be in the range from '1' through '999'.

TRUE BEARING

This is the computed true bearing of the sensor.

RANGE NUMBER

This field always contains the number of the FORACS range performing the test.

REPORT NUMBER

This field contains the number assigned to the report of the tests being processed.

SENSOR DESCRIPTOR

The sensor descriptor number (see table 4) should be placed in this field.

TIME

Time is in hours and hundredths.

BEARING

This is the computed relative bearing of the sensor (except for gyro/SINS it is the computed true bearing, ie, ship's heading).

BEARING SIGN AND ERROR

The sign for this field is '-' for negative errors, 'blank' for zero and positive errors. The error value may be relative, true, or *normalized* (relative or true) as appropriate for the particular sensor. If bearing data were not taken this field contains a '0'.

SIMULATED RANGE

This field contains the computed range to the target plus any range simulated by time delay (ie, the range that the sensor should have read for zero error). This field contains a '0' if range data were not taken.

COMPUTED RANGE

This field contains the range computed from the target's on-range coordinates and the sensor's computed on-range coordinates. This range is a repeat of the simulated range if transponding equipment is not used for introducing time delays. This field contains a '0' if range data were not taken.

RANGE SIGN AND ERROR

In this field the sign is '-' for negative errors, 'blank' for zero and positive errors. This field contains a '0' if range data were not taken.

PLOT CODE

In this field the plot code (see table 2) is inserted.

All bearing data have two decimal places assumed and are in degrees and hundredths. All range data have zero decimal places assumed and are in whole yards. All fields are right-justified and are output without leading zeroes. It should be noted that the '-' sign for negative errors may be placed only in positions 43 or 65. The error magnitude is then right-justified as a positive value in the appropriate columns.

TABLE 2. PLOT CODES.

SONAR				
1st Digit	Meaning	Meaning (Coast Guard) Indicate by '1' in cc 80 of Vehicle Header Card	Meaning (SQS-26, SQS-53)	Meaning BQS-11, 12, 13
1	Passive	Passive		(5) 0-10K
2	1K R.S.	600 yd R.S.		(7) 10K-20K
3	2.5K R.S.	1.5K R.S.		(9) 20K-30K
4	5K R.S.	3.7K-4K R.S.		
5	10K R.S.	6K R.S.	0-10K (ODT; BBT zero-zone start)	
6	15K R.S.	2K R.S.		
7	20K R.S.	8K R.S.	10-20K (ODT; BBT zero-zone start)	
8	40K R.S.	16K R.S.	BBT-10K zone start	
9	25K R.S.		20-30K (ODT; BBT zero zone start)	
2nd Digit	Mode	Meaning	Type of Run	
1	DIFF		Range	
2	DIFF		Bearing	
5	SUM		Range	
6	SUM		Bearing	

GUN FIRE CONTROL SYSTEM

First digit must always be '1'

Second DigitMeaning

1

Automatic track
passive target

2

Automatic track
active target

3

Manual track
passive target

4

Manual track
active targetSURFACE SEARCH RADAR

1st Digit	Meaning
1	7K full scale range (3.5 mi)
2	8K full scale range (4 mi)
3	10K full scale range (5 mi)
4	20K full scale range (10 mi)
5	40K full scale range (20 mi)
6	60K full scale range (30 mi)
7	15K full scale range
8	30K full scale range

PELORUS

First digit=second digit of Sensor Descriptor

ESM

First digit=band number (1 through 9)

DATA EDITING AND HEADER INSERTION

The magnetic-tape data files received from the ranges must be edited and be provided with header information. The program which performs this function is called ED AND INSERT. A flow diagram of this process is shown in figure 3. The editing commands and header information are punched on IBM cards and are merged with the mark data from the range magnetic tape. This program produces a composite magnetic-tape record (mark-by-mark) of identifiable test information.

Vehicle record information is obtained from the range report of the tests. When the information is keypunched, a vehicle-header record precedes all of the data for one

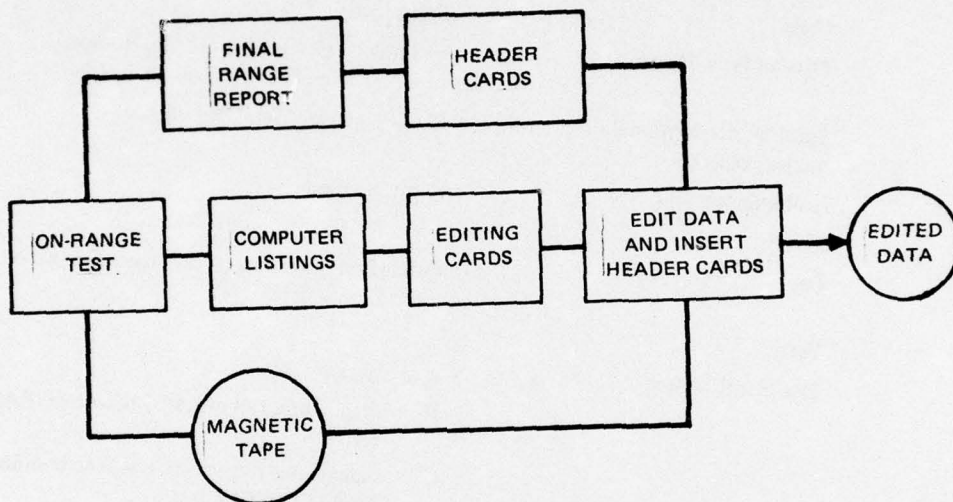


Figure 3. ED AND INSERT processing procedure.

complete test. This record identifies the ship by name, hull number and type, and the FORACs range making the test. The date of the test, and the report number (sequentially assigned to each report) are also placed in this record together with any other information pertinent to special tests. Table 3 lists the information contained in the vehicle records and the card columns assigned to each item.

Equipment header records are used to identify the data for each sensor. These records precede the sensor data entries. A code is used which carries unique information in the form of a triad consisting of the range number, the report number, and the sensor "descriptor" number. This latter number is a two-digit one which identifies the sensor under test. Table 4 lists the descriptors assigned to US sensors. In addition to the triad coding, the equipment header record contains the nomenclature of the sensor and other information pertinent to the test.

TABLE 3. VEHICLE HEADER CARD FOR SHIPS AND SUBMARINES.

IBM Card Column	Data	Remarks
1	Specifies header card	1 = header card
2	FORACS range number	
3-6	Report number	Right justified
7-8	Sensor descriptor	Blank or 00 = vehicle header card
13-36	Vehicle name	Right justified
38-41	Class	Right justified
42	Mission type designation	Example: G = guided missile; R = radar picket; B = ballistic missile
43	Specifies conventional or nuclear vehicle	Blank = conventional; N = nuclear
45-49	Hull number	Right justified
51-52	Month	
53-54	Day	Date of on-range test (if on range 2 days, use second day's date)
55-56	Year	
78	Test identification	A = WSAT B = diagnostics run at SACS before FORACS test C = diagnostics run at SACS before combined FORACS/WSAT test
79	Reference instrument for test (submarine)	P = periscope; D = deck transit; B = both
80	Type vehicle	Blank = surface ship; 1 = Coast Guard; 2 = helicopter; 3 = foreign; 9 = submarine

Each type of sensor (gyrocompass, radar, sonar, etc) has its own unique header-record format. These formats and the information which is coded and retained for US equipment are shown in tables 5 through 12. During the dockside portion of FORACS tests, alignment and lost-motion checks are made on periscopes and gun fire-control systems. These results are contained in the bound range report. In order to put this information into the data bank, cards are punched as shown in figures 4 and 5.

Benchmark checks taken at dockside on periscopes (alignment error and lost-motion values) are placed on periscope header cards (clockwise motion, ie, descriptors 73 and 75) in decimal degrees. The appropriate columns are shown in figure 4. For gun fire-control benchmark checks, alignment-error and lost-motion values are entered in hundredths of minutes on a gun fire-control system header card with a '3' in column nine (fig 5).

TABLE 4. SENSOR DESCRIPTORS.

GYROCOMPASS/SINS (Surface ship or submarine)

- 10 = Settled error (immediately precedes on-range data for same gyro)
- 11 = Forward master
- 12 = Aft auxiliary
- 13 = Gyro CW*
- 14 = Gyro CCW*
- 15 = SINS CW*
- 16 = SINS CCW* or SQS-35 gyro deployed
- 17 = SQS-35 transducer gyro in cradle
- 18 = SINS multi-speed repeater
- 19 = SINS console

*In-harbor tests — data taken during periscope calibration test

SURFACE SHIP SONAR (Except SQS-35)

- 21 = Console
- 22 = Other than console or computer
- 23 = Data computer or converter (or Unit 14 or 23 of SQS-26)
- 34 = Synchro monitor (not used when "recorded at data converter using a SYMON" — only when SYMON is used with manual compensating switch)
- 38 = TRR (Tactical Range Recorder)

SQS-35 SONAR

- 21 = Unit 1, normalized relative bearing
- 22 = Unit 1, true bearing (not norm)
- 23 = Unit 3, normalized relative bearing
- 24 = Unit 3, true bearing (not norm)

SUBMARINE SONAR

- 24 = TDC
 - 25 = Console or control indicator
 - 26 = Analyzer
 - 27 = Compensator 1 (passive)*
 - 28 = Compensator 2 (active or two-track)*
 - 29 = Computer indicator (BQA-3** of BQS-6 or BQS-11, 12, 13; Auxiliary Active Digital Display** of BQS-11, 12, 13)
 - 31 = Signal data converter
 - 32 = Bearing and range indicator Mk 4
 - 33 = Position keeper
 - 34 = Synchro monitor
 - 35 = Unit 13 of BQS-6 or Unit 18 of BQS-11, 12, 13 or Amplifier Scanner Unit 3 of BQR-7
 - 36 = Angle solver
-

*Use only if read directly at compensator, not if read at Unit 13 or Unit 18.

**BQA-3 or AADD will appear as nomenclature on equipment header card.

TABLE 4 (Continued)

HELICOPTER SONAR

39 = Helicopter sonar

GUN FIRE CONTROL SYSTEM

41 = Main system (director, barbette, console)

42 = Main system (computer readouts)

43, 45, 47, 49, 51 = Other systems (director)

44, 46, 48, 50, 52 = Other systems (computer)

57 = Second gunmount

58 = Gunmount

59 = NTDS

SURFACE SEARCH RADAR

61 = Master indicator (CIC)

62-67 = Other indicators

68-69 = NTDS

PERISCOPE

71 = Scope #1 on-range

72 = Scope #2 on-range

73 = Periscope calibration - scope #1-CW

74 = Periscope calibration - scope #1-CCW

75 = Periscope calibration - scope #2-CW

76 = Periscope calibration - scope #2-CCW

PELORUS - (Normalized True Bearing Error)

81 = Port

82 = Starboard

83-84 = Others

85 = Centerline

PELORUS - (Relative Bearing Error)

86 = Centerline

87 = Port

88 = Starboard

89 = Others

PUFFS

91-94

ESM

95

RDF

96

BRD-7

97

TABLE 5. GYROCOMPASS/SINS EQUIPMENT HEADER CARD.

Column	Data	Remarks
1	Specifies header card	1 = header card
2	FORACS range number	
3-6	Report number	Right justified
7-8	Sensor descriptor	
29-32	GYRO or SINS	
34-36	Mark number (digits)	Right justified*
37-38	Mark number (letters)	Left justified*
40-41	Mod number (digits/letters)	Right justified*
42	Mod number (letters/digits)	
44-48	Settled error (hundredths)	Codes for no data (cols. 45-46): 99 = Test not performed (always used with sensor descriptor 16 for SQS-35); 97 = Test performed incorrectly (or insufficient data); 95 = gyro not settled
68	Why equipment not tested or not used in FORACS data bank	F = FORACS malfunction; E = equipment malfunction; W = weather; N = no reason given; T = taken in true bearing; I = insufficient data; Z = data not retrievable; R = other reasons; S = ship's request; U = SQS-35 gyro unsettled when deployed (use only with sensor descriptor 16)
71	Adjustment code	A = bearing data taken before adjustment; J = bearing data taken after adjustment; blank = no adjustments made during test
80	Type vehicle	Blank = surface ship; 1 = Coast Guard; 2 = Helicopter; 3 = foreign; 9 = submarine

*Gyro designation

TABLE 6. SURFACE-SHIP SONAR EQUIPMENT HEADER CARD.

Column	Data	Remarks
1	Specifies header card	1 = header card
2	FORACS range number	
3-6	Report number	Right justified
7-8	Sensor descriptor	
9	Type run	1 = Range runs; 2 = Bearing runs; 3 = no data; Blank = both range & bearing runs
10-16	Range scale in yards	Right justified
28-32	SONAR	
34-36	Digits	Right justified*
37-38	Letters	Left justified*
45	Process with or w/o baffle limits	Blank = normal baffle limits; B = no baffle limits
46	MIK or modification	M = MiK (or modification); W = without MIK or mod
47	Mounting position	B = bow mounted; blank = dome mounted
48	Signal processing	S = SUM; D = DIFF; B = both
49	Active or Passive mode	Blank = Active; P = passive
50-52	Sector width (degrees)	Number if only one sector width was used; V = sector width was varied (52)
54-57	Sound speed ft/sec	
62-64	Pulse length in ms	Number if given, otherwise use col. 64; C = short; M = medium; G = long; A = combinations
65-67	Mode	RDT, SDT, (SQS-23); ODT, BBT (SQS-26); FHS SHS (SQS-35); OMN, ATT (SQS-38)
68	Why equipment not tested, or not used in FORACS data bank	F = FORACS malfunction; E = equipment malfunction; W = weather; N = no reason given; T = taken in true bearing; I = insufficient data; Z = data not retrievable; R = other reasons; S = ships request; U = SQS-35 gyro unsettled when deployed invalidates bearing data; Q = when one header card serves to identify more than one file, indicates one of the files is invalid
71	Adjustment codes	Blank = no adjustments made during test; A = bearing data before adjustment; J = bearing data after adjustment; B = range data before adjustment; K = range data after adjustment; C = both range & bearing before the adjustment; L = both range & bearing after adjustment
80	Type vehicle	Blank = surface ship; 1 = Coast Guard; 3 = foreign

*Sonar type designation (SQQ-23 PAIR = 23P)

TABLE 7. SUBMARINE SONAR EQUIPMENT HEADER CARD.

Column	Data	Remarks
1	Specifies header card	1 = header card
2	FORACS Range number	
3-6	Report number	Right justified
7-8	Sensor descriptor	
9	Type run	1 = Range runs; 2 = Bearing runs; 3 = no data; Blank = both bearing & range runs
10-16	Range scale in yds	Right justified
30-32	Nomenclature	Sonar nomenclature (e.g., BQR, BQS, BQA)* If BQS-6 or BQS-11, 12, 13 read at BQA-3, use BQA-3 nomenclature designation; same for AADD.
34-36	Digits	Right justified*
37-38	Letters	Left justified*
45	Process with or w/o limits	Blank = normal baffle limits; B = without baffle limits
46	Modification	M = modified (or with field change); W = without modification
47	Mounting position	B = bow mounted; blank = dome mounted
48	Signal processing	S = SUM; D = DIFF; B = both
49	Active or Passive mode	A = active; P = passive; T = two track
54-57	Sound speed ft/sec	
62-64	Pulse length in ms	Number if given; otherwise use col. 64; C = short; M = medium; G = long; A = combination
65-67	Mode (when given)	ATF (BQR-2, 7, BQS-6 Pass.) G (gated) or N (normal) in col. 65 for BQS-11, 12, 13 Active; blank = combination of modes
68	Why equipment not tested or used in FORACS data bank	F = FORACS malfunction; E = equipment malfunction; W = weather; N = no reason given; T = taken in true bearing; I = insufficient data; Z = data not retrievable; R = other reasons; S = ship's request; Q = when one header serves to identify more than one file, indicates one of the files is invalid.
71	Adjustment code	Blank = no adjustments made during test; A = bearing data before adjustment; J = bearing data after adjustment; B = range data before adjustment; K = range data after adjustment; C = both range & bearing data before adjustment; L = both range and bearing data after adjustment
80	Type vehicle	9 = submarine

*Sonar type designation

TABLE 8. GUN FIRE-CONTROL SYSTEM EQUIPMENT HEADER CARD.

Column	Data	Remarks
1	Specifies header card	1 = header card
2	FORACS range number	
3-6	Report number	Right justified
7-8	Sensor descriptor	
9	Type data	1 = range only; 2 = bearing only; 3 = no data; blank = both bearing and range
29-32	GFCS	
34-36	Digits	Right justified*
37-38	Letters	Left justified*
44	Mode	Tracking mode for range data: T = auto track; M = manual track; B = both
56-60	Alignment error	in hundredths of minutes**
62-66	Lost motion	in hundredths of minutes**
68	Why equipment not tested or used in FORACS data bank	F = FORACS malfunction; E = equipment malfunction; W = weather; N = no reason given; T = taken in true bearing; I = insufficient data; Z = data not retrievable; R = other reasons; S = ship's request; Q = when one header card serves to identify more than one file, indicates one or more of the files is invalid.
71	Adjustment codes	Blank = no adjustment made during test; A = bearing data before adjustment; J = bearing data after adjustment; B = range data before adjustment; K = range data after adjustment; C = both range and bearing before adjustment; L = both range and bearing after adjustment
80	Type vehicle	Blank = surface ship; 1 = Coast Guard; 3 = foreign

*GFCS designation

**Benchmark checks (make a separate header card for benchmark checks — use a "3" in column 9)

TABLE 9. SURFACE-SEARCH RADAR EQUIPMENT HEADER CARD.

Column	Data	Remarks
1	Specifies header card	1 = header card
2	FORACS range number	
3-6	Report number	Right justified
7-8	Sensor descriptor	
9	Type data	1 = range only; 2 = bearing only; 3 = no data; blank = both bearing and range
10-16	Range scale in yards	Right justified. Should appear on header card only if all data were taken on same range scale.
25-32 OR 30-32	SS RADAR	<u>Surface ships only</u>
34-36	Radar nomenclature	<u>Submarines only</u> (BPS, SS - right justified)
37-38	Digits	Right justified*
40-41	Letters	Left justified *
42	Digits	Right justified**
42	Letters	
68	Why equipment not tested or not used in FORACS data bank	F = FORACS malfunction; E = equipment malfunction; W = weather; N = no reason given; T = taken in true bearing (or normalized true bearing error given); I = insufficient data; semi-color; Z = data not retrievable; R = other reasons; S = ship's request; Q = when one header card serves to identify more than one file, indicates one of the files is invalid.
71	Adjustment code	Blank = no adjustment made during test; A = bearing data taken before adjustment; J = bearing data taken after adjustment; B = range data taken before adjustment; K = range data taken after adjustment; C = both range & bearing data taken before adjustment; L = both range & bearing data taken after adjustment
80	Type vehicle	Blank = surface ship; 1 = Coast Guard; 2 = helicopter; 3 = foreign; 9 = submarine

*Radar designation

**Radar indicator (enter only if AN/SPA- indicator)

TABLE 10. ESM EQUIPMENT HEADER CARD.

Column	Data	Remarks
1	Specifies header card	1 = header card
2	FORACS range number	
3-6	Report number	Right justified
7-8	Sensor descriptor	95 = ESM; 96 = RDF; 97 = BRD-7
14	Band designation	Lowest band no. used
26-28	ESM	Alphanumeric input for identification
30-32	TYPE	WLR or BLR, RDF, BRD
34-36	NUMBER DIGITS	ESM identification - right justified
37	LETTER	ESM identification
39-42	Antenna type	Digits only - right justified
68	Why equipment not tested or used in FORACS data bank	F = FORACS malfunction; E = equipment malfunction; W = weather; N = no reason given; T = taken in true bearing; I = insufficient data; Z = data not retrievable; R = other reasons; S = ship's request; Q = when one header card serves to identify more than one file, indicates one of the files is invalid.
80	Type vehicle	1 = Coast Guard; 3 = foreign; 9 = submarine; blank = surface ship

TABLE 11. PELORUS EQUIPMENT HEADER CARD.

Column	Data	Remarks
1	Specifies header card	1 = header card
2	FORACS range number	
3-6	Report number	Right justified
7-8	Sensor descriptor	
25-32	PEL ALID	Alphanumeric input for pelorus alidade
34-36	Mark number	Alidade designation - right justified
40-41	Mod number	Alidade designation - right justified
68	Why equipment not tested or used in FORACS data bank	F = FORACS malfunction; E = equipment malfunction; W = weather; N = no reason given; I = insufficient data; Z = data not retrievable; R = other reasons; S = ship's request; Q = when one header card serves to identify more than one file, indicates one of the files is invalid.
80	Type vehicle	1 = Coast Guard; 3 = foreign; blank = surface ship

TABLE 12. PERISCOPE EQUIPMENT HEADER CARD.

Column	Data	Remarks
1	Specifies header card	1 = header card
2	FORACS range number	
3-6	Report number	Right justified
7-8	Sensor descriptor	
30-32	PER	
34-36	Digits	Right justified*
37-38	Letters	Left justified *
40-42	Readout	Left justified — Analyzer = AN (e.g., Analyzer B = ANB) TDC, Position Keeper = PK; Bearing Transmitter = BT; Angle S Solver = AS; Periscope Ring = PR; Synchro Monitor = SYM (before 1 Oct 72). After Oct. 1 72, any symon used is SEACO SYMON; indicate by adding "S" to first two letters of designation for indicator the symon was used to read (ANS, PKS, etc.)
44-48	Low power alignment error	} Benchmark checks; enter on "clockwise" header cards (descriptors 73 & 75) in hundredths of degrees. Leave blank if not read. Minus sign for AE in columns 45-46.
50-54	Low power lost motion	
56-60	High power alignment error	
62-66	High power lost motion	
68	Why equipment not tested or used in FORACS data bank	F = FORACS malfunction; E = equipment malfunction; W = weather; N = no reason given; T = taken in true bearing; I = insufficient data; Z = data not retrievable; R = other reasons; S = ship's request
71	Adjustment code	Blank = no adjustments made during the test; A = bearing data taken before adjustment; J = bearing data taken after adjustment
80	Type vehicle	9 = submarine

*Periscope designation

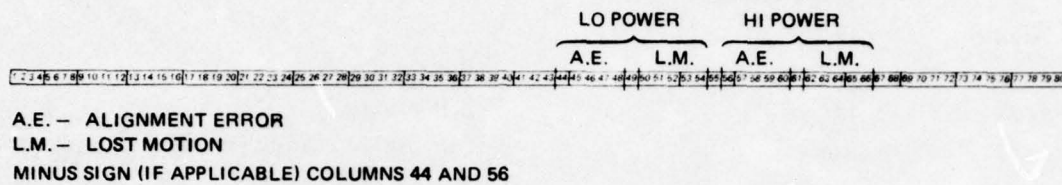


Figure 4. Periscope benchmark checks.

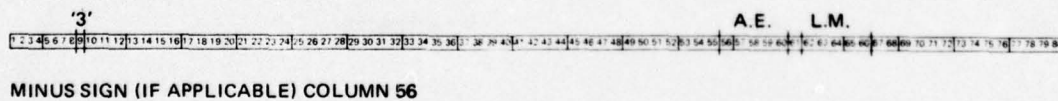


Figure 5. Gun fire-control system benchmark checks.

Data associated with each mark are punched in standard format and are divided into nine fields as shown in figure 6.

STANDARD-CARD FORMAT

The following is a brief discussion of the standard-card fields and the type of information which is punched. It should be noted that all bearing data assume two decimal places and are expressed in degrees and hundredths of a degree. All fields are right-justified. Also to be noted is that the sign '-' for negative errors may be placed only in positions 43 or 65. The error magnitude is then right-justified as a positive value in the appropriate field.

EDIT CODE

This code field is left blank if the range and bearing errors are valid. A '1' is punched if the range error is valid but the bearing error is not or has not been taken. A '2' is punched if the bearing error is valid but the range error is not or has not been taken, and a '3' is punched if both errors are invalid.

MARK NUMBER

Mark numbers are punched in the range from '1' through '999'. This field is always right-justified.

REPORT NUMBER

The number assigned to the test report is punched in this field.

		1										2										3										4										5										6										7										8										9									
		MARK NO.										RANGE ERROR										BEARING ERROR										SIMULATED RANGE										ACTUAL RANGE										RANGE ERROR										PLOT CODE																													
EDIT CODE		0000000000										0000000000										0000000000										0000000000										0000000000										0000000000										0000000000										0000000000										0000000000									
MARK NO.		0000000000										0000000000										0000000000										0000000000										0000000000										0000000000										0000000000										0000000000										0000000000									
RANGE ERROR		0000000000										0000000000										0000000000										0000000000										0000000000										0000000000										0000000000										0000000000										0000000000									
BEARING ERROR		0000000000										0000000000										0000000000										0000000000										0000000000										0000000000										0000000000										0000000000										0000000000									
SIMULATED RANGE		0000000000										0000000000										0000000000										0000000000										0000000000										0000000000										0000000000										0000000000										0000000000									
ACTUAL RANGE		0000000000										0000000000										0000000000										0000000000										0000000000										0000000000										0000000000										0000000000										0000000000									
RANGE ERROR		0000000000										0000000000										0000000000										0000000000										0000000000										0000000000										0000000000										0000000000										0000000000									
PLOT CODE		0000000000										0000000000										0000000000										0000000000										0000000000										0000000000										0000000000										0000000000										0000000000									

Figure 6. Standard card format.

TIME

Time is punched in hours and hundredths of hours.

SENSOR DESCRIPTOR

The number, taken from table 4, which identifies the sensor is punched in this field.

BEARING

This number represents the computed relative bearing of the sensor (except for gyro/SINS, it is the computed true bearing, ie, ship's heading).

BEARING SIGN AND ERROR

The sign "-" is used for negative errors and a blank is left in this field for zero and positive errors. The error value may be relative, true, or normalized (relative or true) as appropriate for the particular sensor. If bearing data were not taken, an "0" is punched in this field.

SIMULATED RANGE

This is the computed range to the target plus any range simulated by time delay (the range that the sensor should have read for zero error).

ACTUAL RANGE

This is the range computed from the target's on-range coordinates. This is a repeat of the simulated range if transponding equipment was not used for introducing time delays.

RANGE SIGN AND ERROR

The sign "-" is used for negative errors and a blank is left for zero and positive errors. If no range data were taken a "0" must be punched in this field.

PLOT CODE

The plot code number, taken from table 2, contains three digits and is used to identify range scales, zone start information, and other variables.

EDITING FUNCTIONS

The editing portion of the program allows any desired changes to be made to the magnetic-tape data. Changes can be made to any field to replace the entire mark, remove it, or to accept only selected data. In addition, editing cards can be used to delete specific data from statistical analyses without disturbing the permanent magnetic-tape record.

Setting of upper and lower limits on data values can also be accomplished with editing cards so as to exclude from statistical analyses any values which are not true indicators of equipment performance. These values are termed "outliers" and may be caused by incorrect readings, typographical errors, tracking of the wrong target, or other events. The editing program also permits the identification and retention of data collected beyond sonar baffle limits.

EDITING CARD DOCUMENTATION

Ten unique cards are used in the editing program. These cards are designated A, B, C, D, E, P, K, R, and I.

A CARD

The A card is used to remove marks from the tape record. If one mark number is to be removed, columns 5 through 8 are used.

```

A
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80
B END
E
G
I
N
MARK NO.

```

Figure 7. A card format.

B CARD

The B card is used to remove any editing from bearing data outside baffle limits so that the data will appear on the Compute Sensor Listing but will not be used as a valid sonar sector. If an editing card deletes baffle data (because of the limits which were used), the B card is placed after the editing card. Then, if there are outliers in the baffle area, D cards are used to delete.

```

B
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80
L U
O P
W P
E E
R R
B B
A A
F F
F F
L L
E E

```

Figure 8. B card format.

C CARD

The C card is used to edit by plot codes (setting limits or bounds on data with specific plot codes). When an 'L' is placed in column 2, editing by setting limits will be accomplished. If a 'B' is placed in this column, only bearing will be deleted; if an 'R' is used, only range will be deleted; if an 'A' is used, the data with that plot code will be removed from the tape; and if the column is left blank, both bearing and range will be deleted.

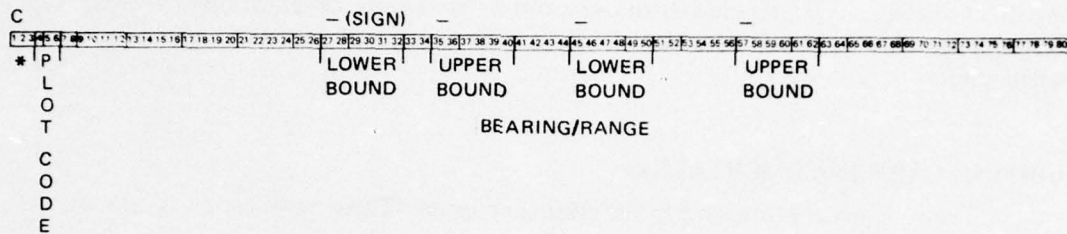


Figure 9. C card format.

D CARD

The D card is used to delete marks from computations in subsequent processing. The coded marks will be retained on the tape record. If a 'B' is used in column 2 of this card, only bearing will be deleted. If an 'R' is used, only range will be deleted, and if the column is left blank, both bearing and range will be deleted. To delete one mark number, columns 5 through 8 are used.

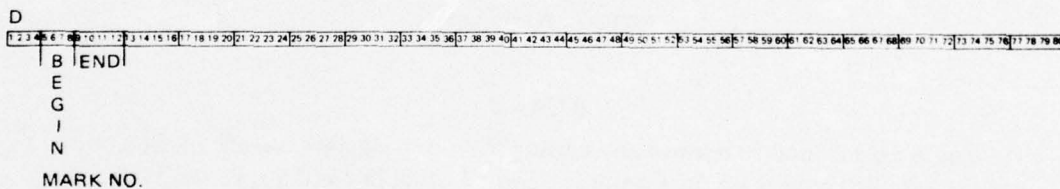


Figure 10. D card format.

E CARD

The E card is used to set limits or bounds on bearing or range errors. The marks which fall beyond the limits remain on the tape record but are coded so that they will not be used in any computations in subsequent processing. The E card is also used to clear range or bearing editing in all preceding editing (except for A cards). Therefore, all other editing cards should follow the E card. A 'B' in column 2 clears all bearing editing and an 'R' in this column clears all range editing. For an 'EB' or 'ER' on one mark number, columns 5 through 8 are used.

[illegible]

Figure 11. E card format.

P CARD

The P card is used to partially replace any information in the standard card format. It can also be used to change the entire data set for information contained in fields 1 and 2, including the same information on the equipment header record (card). In column 2, '1' is the range number replacement, '2' is the report number and sensor descriptor replacement, '3' is the time replacement, '4' is bearing replacement, '5' is bearing error replacement, '6' is adjusted range replacement, '7' is actual range replacement, '8' is range error replacement, and '9' is plot code replacement. To partially replace only one mark number, columns 5 through 8 are used. When replacing a range or report number or a sensor descriptor (changing fields 1 or 2) the header card and all the data cards will be changed by leaving columns 5 through 12 blank. If no mark numbers are entered for any P card, the field replaced will be changed for all marks.

[illegible]

Figure 12. P card format.

K CARD

The K card is used when data run together and must be separated (when sensors are given the same sensor descriptor number and are run back-to-back on the tape file). The K card is the header card for the second group of data. For example, tape descriptor 40 contains bearing data taken at a gun mount (descriptor 58) and range data taken at a director (descriptor 41). Marks 1 through 58 and 102 through 385 represent gun-mount data and marks 59 through 101 and 386 through 422 represent director data. Editing is accomplished as follows: prepare a P card with '2' in column 2 which changes the descriptor to 58; prepare two A cards to remove marks 59 through 101 and marks 386 through 422; prepare an E card to place limits on gun-mount data; prepare a D card to delete specific gun-mount data; prepare a K card for director data (descriptor numbers will automatically be inserted in individual marks); prepare two A cards to remove marks 1 through 58 and 102 through 385; prepare an E card to place limits on director data; and prepare a D card to remove any specific director data. When the cards are processed they are to be stacked in the order just discussed.

K
(REGULAR HEADER CARD FORMAT)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
---	---	---	---	---	---	---	---	---	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----

Figure 13. K card format.

R or I CARDS

An R card is a replacement mark number and an I card is an inserted mark. Both are cut in standard card format except for column 1 which may contain either an 'R' or 'I'. The letter is not critical in this one case because the same routine in the program is used for either 'R' or 'I'. All values should be key-punched for consistency. If, for example, there were no range data, the last columns for adjusted, actual, and error (columns 56, 64, and 72) should contain a '0'. Leading zeroes are not to be key-punched. If, for example, the listing reads -0.08, only '8' is to be on the card. Trailing zeroes are essential, thus 0.50 must be shown on the card as '50' as a bearing error. Whenever any data are replaced or inserted, editing has not been performed. For this reason, the mark should be checked against the desired limits and the proper editing code should be placed in column 3. The edit code for this card (column 3): 'blank' to indicate range and bearing errors are valid, '1' that range error is valid and bearing error is either not valid or has not been taken, '2' that bearing error is valid and range error is either not valid or has not been taken, and '3' that both range and bearing errors are invalid. Alternately, an editing card or cards may be placed following the inserted cards so that they will be properly edited. The order in which the cards are placed is shown in figure 15.

R
(REGULAR HEADER CARD FORMAT)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
---	---	---	---	---	---	---	---	---	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----

I
(REGULAR HEADER CARD FORMAT)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
---	---	---	---	---	---	---	---	---	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----

Figure 14. R or I card format.

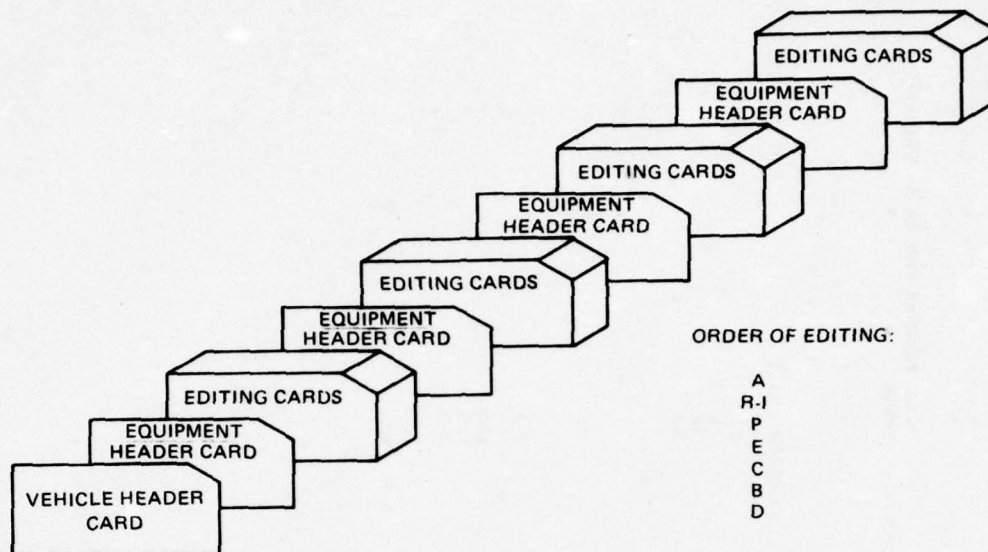


Figure 15. Card assembly for editing.

ED AND INSERT SAMPLE PRINTOUTS

Listings from the ED AND INSERT program are shown in figure 16. The first page of this figure is a listing of the editing deck showing header cards followed by editing cards. The second page is a listing of header cards generated by the ED AND INSERT program using the information on the preceding header card and dividing the data into appropriate range scales as designated by plot codes. These pages are followed by output listings consisting of vehicle header information followed by editing, equipment headers, and mark-by-mark listings for the following components: gyrocompass (page 26), sonar (pages 27 through 31), GFCS (pages 32 and 33), surface-ship radar (pages 34 through 37), periscope (pages 38 and 39), and peloruses (pages 40 and 41).

EDITING DECK
 17 88800
 17 88812
 E
 D
 D
 D
 D
 17 88821 10000
 CL 52
 CL 3
 CL 4
 CL 51
 CL 7
 B 135 225
 D 18 19
 DB 311
 OR 489
 17 888412
 E
 17 888441
 E
 17 88861
 CL 2
 CL 3
 CL 4
 DB 304
 DB 306
 17 888732
 A 13
 A 22
 P4 17
 P5 17
 E
 17 888742
 E
 D 227
 17 88881
 P4 277
 CL 1
 CL 2 15
 D 371

JOAN CATHERINE SS 9999 122576
 GYRO 999 99A - 16
 - 50 20

SONAR 999CB M D 50535050 GSDT
 - 200 100 - 40 90
 - 10 25
 - 40 35
 - 40 90
 - 120 40

GFCS 999C 0
 - GFCS 999C - 27 0
 SS RADAR 999A 990 - 20 120
 - 150 100 - 50 120
 - 150 100 - 140 140

PER 999A A6C - 4 0 - 6 0

32749 - 10
 - 20 5
 - 15 10
 PER 999A A6C
 PEL ALID 999 99 8435
 - 100 0
 - 100 20

THIS PROGRAM RUN ON 07 OCT 1976
 999CB 9

Figure 16. ED AND INSERT listing (part 1).

THIS PROGRAM RUN ON 07 OCT 1976		18 JUNE 1973 VERSION	
17 88800	JOAN CATHERINE	SS	9999 122576 999C8 9
17 868112	GYRO 999	99A - 16	
17 868212	SONAR 999C8	M D	50505050 GSDT
17 868211	SONAR 999C8	M D	50505050 GSDT
17 868211	SONAR 999C8	M D	50505050 GSDT
17 868211	SONAR 999C8	M D	50505050 GSDT
17 868211	SONAR 999C8	M D	50505050 GSDT
17 868412	GFC5 999C	T	
17 868441	GFC5 999C	TP	
17 868612	SS RADAR 999A	99D	
17 868611	SS RADAR 999A	99D	
17 868611	SS RADAR 999A	99D	
17 868611	SS RADAR 999A	99D	
17 868732	PER 999A	ABC - 4	0 - 6 0 9
17 868742	PER 999A	ABC	
17 868812	PER ALID 999	99	
17 868822	PER ALID 999	99	

Figure 16. ED AND INSERT listing (part 2).

THIS PROGRAM RUN ON 07 OCT 1976

17 88800
 BEARING LIMITS -20 TO 20 FOR MARKS
 MARK 6 DELETED FROM COMPUTATIONS
 MARK 421 DELETED FROM COMPUTATIONS
 MARK 430 DELETED FROM COMPUTATIONS

JUAN CATHERINE SS 9999 122576 999C8
 1 THU 433

9

SENSOR 1		17 888112		GYRU 999 99A - 16																			
EXIT MARK	CODE	NUM	RAN	REP	UES	SEN	TIME	ACTUAL	BEAR	ERROR	ADJUST	ACTUAL	RANGE	RANGE	ERROR	PLUT	CODE						
2	1	1	7	888	11		1007	6075	-	15	0	0	0	0	0	102							
2	3	3	7	888	11		1010	6033	-	15	0	0	0	0	0	102							
2	4	4	7	888	11		1012	6046	-	16	0	0	0	0	0	102							
2	5	5	7	888	11		1018	6233	-	13	0	0	0	0	0	102							
3	6	6	7	888	11		1018	6285	-	35	0	0	0	0	0	102							
2	7	7	7	888	11		1020	6186	-	11	0	0	0	0	0	102							
2	8	8	7	888	11		1022	6302	-	11	0	0	0	0	0	102							
2	9	9	7	888	11		1023	6425	-	17	0	0	0	0	0	102							
2	11	11	7	888	11		1025	6505	-	14	0	0	0	0	0	102							
2	12	12	7	888	11		1027	6217	-	12	0	0	0	0	0	102							
2	13	13	7	888	11		1027	6204	-	15	0	0	0	0	0	102							
2	14	14	7	888	11		1028	6208	-	18	0	0	0	0	0	102							
2	16	16	7	888	11		1030	5960	-	5	0	0	0	0	0	102							
2	17	17	7	888	11		1030	5901	-	12	0	0	0	0	0	102							
3	18	18	7	888	11		1032	5719	-	151	0	0	0	0	0	102							
2	19	19	7	888	11		1033	5220	-	20	0	0	0	0	0	102							
2	20	20	7	888	11		1037	4749	-	14	0	0	0	0	0	102							
2	412	412	7	888	11		1063	4631	-	14	0	0	0	0	0	102							
2	413	413	7	888	11		1067	4243	-	18	0	0	0	0	0	102							
2	414	414	7	888	11		1067	4391	-	11	0	0	0	0	0	102							
2	415	415	7	888	11		1068	4534	-	18	0	0	0	0	0	102							
2	416	416	7	888	11		1068	4601	-	21	0	0	0	0	0	102							
2	417	417	7	888	11		1070	4777	-	19	0	0	0	0	0	102							
2	418	418	7	888	11		1070	4916	-	21	0	0	0	0	0	102							
2	419	419	7	888	11		1072	5029	-	19	0	0	0	0	0	102							
3	421	421	7	888	11		1077	4074	-	9	0	0	0	0	0	102							
2	422	422	7	888	11		1077	4247	-	22	0	0	0	0	0	102							
2	423	423	7	888	11		1078	4390	-	28	0	0	0	0	0	102							
2	424	424	7	888	11		1078	4528	-	19	0	0	0	0	0	102							
2	425	425	7	888	11		1078	4637	-	20	0	0	0	0	0	102							
2	426	426	7	888	11		1080	4739	-	17	0	0	0	0	0	102							
2	427	427	7	888	11		1087	5585	-	19	0	0	0	0	0	102							
2	428	428	7	888	11		1087	5476	-	14	0	0	0	0	0	102							
3	430	430	7	888	11		1090	4982	-	20	0	0	0	0	0	102							
2	431	431	7	888	11		1090	4651	-	11	0	0	0	0	0	102							
2	432	432	7	888	11		1092	4725	-	17	0	0	0	0	0	102							
2	433	433	7	888	11		1093	4805	-	17	0	0	0	0	0	102							

Figure 16. ED AND INSERT listing (part 3).

BEARING LIMITS -200 TO 100 FOR MARKS WITH PLOT CODE OF 527
 RANGE LIMITS -40 TO 90 FOR MARKS WITH PLOT CODE OF 527
 RANGE LIMITS -10 TO 25 FOR MARKS WITH PLOT CODE OF 377
 RANGE LIMITS -40 TO 35 FOR MARKS WITH PLOT CODE OF 477
 RANGE LIMITS -40 TO 50 FOR MARKS WITH PLOT CODE OF 517
 RANGE LIMITS -120 TO 40 FOR MARKS WITH PLOT CODE OF 777
 MARKS 10 THRU 19 DELETED FROM COMPUTATIONS
 BEARING DATA DELETED FROM MARK 311
 RANGE DATA DELETED FROM MARK 489

SENSOR	2	17	608212	10000	SONAR 999CB	M D	50505050	GSDT			
EDIT MARK CODE NUM	RAN	REP	DES	SEN	TIME	ACTUAL BEAR	BEAR ERROR	ADJUST RANGE	ACTUAL RANGE	RANGE ERROR	PLOT CODE
2	7	888	21	898	517	-	137	8597	0	68	522
3	7	888	21	900	744	-	119	8539	0	66	522
4	7	888	21	902	521	-	121	8043	0	59	522
6	7	888	21	905	1006	-	66	7920	0	10	522
7	7	888	21	907	1041	-	21	7884	0	26	522
8	7	888	21	907	1005	-	55	7861	0	13	522
9	7	888	21	908	908	-	68	7838	0	35	522
10	7	888	21	910	673	-	123	7795	0	35	522
11	7	888	21	910	590	-	130	7745	0	40	522
12	7	888	21	912	821	-	121	8089	0	26	522
13	7	888	21	913	1063	-	23	8029	0	36	522
14	7	888	21	915	1124	-	24	7988	0	20	522
15	7	888	21	915	1057	-	32	7945	0	29	522
16	7	888	21	917	764	-	134	7903	0	22	522
17	7	888	21	917	124	-	74	7862	0	30	522
3	18	7	888	21	918	35765	10	7822	0	66	522
3	19	7	888	21	918	35755	65	7782	0	28	522
20	7	888	21	920	35941	-	66	7741	0	44	522
21	7	888	21	922	423	-	123	8501	0	54	522
3	22	7	888	21	922	535	-	245	8463	149	522
312	7	888	21	1443	7471	-	71	8411	0	4	522
313	7	888	21	1443	7851	-	91	8413	0	5	522
314	7	888	21	1445	8234	-	59	8419	0-	1	522
315	7	888	21	1445	8589	-	49	8427	0-	5	522
316	7	888	21	1447	8897	-	22	8438	0-	6	522
317	7	888	21	1447	9188	-	12	8451	0	1	522
318	7	888	21	1448	9644	-	19	7640	0	32	522
319	7	888	21	1450	9843	-	37	7658	0	44	522
320	7	888	21	1450	10163	-	17	7685	0	20	522
321	7	888	21	1452	10395	-	45	7706	0	42	522
322	7	888	21	1452	10598	-	23	7728	0	38	522
323	7	888	21	1453	10863	-	13	7763	0	31	522
324	7	888	21	1455	11079	-	29	7787	0	47	522
325	7	888	21	1455	11360	-	10	7814	0	31	522
326	7	888	21	1457	11819	-	39	7858	0	50	522
327	7	888	21	1458	12113	-	53	7890	0	49	522
328	7	888	21	1458	12617	-	47	7937	0	48	522
329	7	888	21	1460	12984	-	4	7971	0	47	522

Figure 16. ED AND INSERT listing (part 4).

SENSOR 3		17 868211		2500		SONAR 999CB		M D		50505050		65DT			
EDIT MARK	CODE NUM	RAN	REP	SEN	DES	TIME	ACTUAL BEAR	BEAR ERROR	ADJUST RANGE	ACTUAL RANGE	RANGE ERROR	PLOT CODE			
1	483	7	888	21		1700	112	-	12	2510	0-	5	312		
1	484	7	888	21		1702	35943	-	18	2472	0	11	312		
3	486	7	888	21		1703	35866		34	0	0	0	312		
1	487	7	888	21		1705	0		0	2347	0	18	312		
1	488	7	888	21		1705	21	-	81	2317	0	3	312		
3	489	7	888	21		1708	35950	-	325	2652	0	0	312		
1	490	7	888	21		1710	71	-	11	2154	0	11	312		
1	491	7	888	21		1710	27	-	7	2125	0	20	312		
1	492	7	888	21		1712	35992	-	17	2088	0	22	312		
1	493	7	888	21		1712	35978	-	28	2052	0	10	312		
1	494	7	888	21		1713	35951	-	51	2017	0	1	312		
1	502	7	888	21		1723	96	-	86	1865	0	4	312		
1	503	7	888	21		1723	61	-	21	1670	0-	2	312		
1	504	7	888	21		1725	0		0	1658	0-	8	312		
1	505	7	888	21		1725	35982	-	7	1648	0-	4	312		
1	506	7	888	21		1727	35971	-	31	1641	0	2	312		
1	507	7	888	21		1727	35992	-	62	1634	0-	4	312		
1	508	7	888	21		1733	87	-	13	1512	0-	7	312		
1	509	7	888	21		1735	101	-	21	1484	0-	2	312		
1	510	7	888	21		1735	0		0	1454	0-	4	312		
1	511	7	888	21		1737	35997	-	22	1423	0-	5	312		
1	512	7	888	21		1737	29	-	9	1392	0-	2	312		
1	513	7	888	21		1738	43	-	18	1354	0-	4	312		

Figure 16. ED AND INSERT listing (part 5).

SENSOR	4	17 868211	5000	SONAR 999CB		M D	50505050 GSDT		
EDIT MARK				RAN	SEN		ADJUST	ACTUAL	PLOT
CODE NUM				REP	DES	BEAR	RANGE	RANGE	CODE
						ERROR	ERROR	ERROR	
1 442	7	888 21	1650	35530	-	20	4658	0	16
1 446	7	888 21	1657	35818	-	8	4502	0	3
1 447	7	888 21	1657	35839	-	9	4471	0	14
1 448	7	888 21	1658	35887	-	53	4442	0	20
1 449	7	888 21	1658	35844	-	24	4412	0	33
1 450	7	888 21	1660	35849	-	9	4383	0	22
1 451	7	888 21	1660	35776	-	49	4351	0	21
1 458	7	888 21	1673	91	34	4175	0	30	412
1 459	7	888 21	1677	43	77	3619	0	20	412
1 460	7	888 21	1678	7	117	3469	0	26	412
1 461	7	888 21	1680	23	2	3426	0	4	412
1 462	7	888 21	1680	26	-	1	3371	0	9
1 463	7	888 21	1682	17	-	77	3318	0	20
1 464	7	888 21	1682	35877	-	2	3280	0	25
1 465	7	888 21	1683	35828	-	53	3242	0	6
1 466	7	888 21	1685	104	-	64	4432	0	17
1 467	7	888 21	1685	0	0	4398	0	12	412
1 468	7	888 21	1687	35905	-	55	4362	0	20
1 469	7	888 21	1688	35950	-	50	4725	0	29
1 470	7	888 21	1688	35938	-	2	4689	0	23
1 471	7	888 21	1690	35904	-	54	4654	0	27
1 472	7	888 21	1692	0	0	2903	0	18	412
1 473	7	888 21	1692	61	19	2865	0	13	412
1 474	7	888 21	1693	35962	-	22	2837	0	13
1 475	7	888 21	1693	35912	-	52	2800	0	25
1 476	7	888 21	1695	35894	-	44	2764	0	21
1 477	7	888 21	1695	35946	-	36	2728	0	28
1 497	7	888 21	1718	35901	-	1	1811	0	6
1 498	7	888 21	1718	35780	-	55	1790	0	35
1 499	7	888 21	1720	35718	-	22	1771	0	6
1 501	7	888 21	1722	63	-	3	1728	0	24

Figure 16. ED AND INSERT listing (part 6).

SENSOR		5	17 868211		10000	SONAR 999CB		M D	50505050		GSDT		
EDIT MARK	CODE NUM	RAN	REP	SEN	TIME	ACTUAL BEAR	BEAR ERROR	ADJUST RANGE	ACTUAL RANGE	RANGE ERROR	PLOT CODE		
1 385	7 888 21	1592	359	-	59	9529	0	46	512				
1 386	7 888 21	1592	291	-	51	9504	0	66	512				
1 387	7 888 21	1593	289	-	49	9481	0	73	512				
1 388	7 888 21	1593	298	-	58	9460	0	88	512				
1 389	7 888 21	1595	335	-	35	9439	0	66	512				
1 390	7 888 21	1597	320	-	45	9419	0	75	512				
1 391	7 888 21	1597	356	-	126	9400	0	73	512				
1 392	7 888 21	1598	227	-	52	9383	0	71	512				
1 393	7 888 21	1600	253	-	23	8511	0	70	512				
1 394	7 888 21	1600	258	-	18	3496	0	68	512				
1 395	7 888 21	1602	232	-	12	8481	0	70	512				
1 396	7 888 21	1602	196	-	46	8466	0	80	512				
1 397	7 888 21	1603	236	-	36	8451	0	59	512				
1 398	7 888 21	1603	253	-	28	8435	0	70	512				
1 399	7 888 21	1605	256	-	46	8419	0	69	512				
1 400	7 888 21	1638	234	-	34	6720	0	4	512				
1 401	7 888 21	1638	199	-	24	6717	0	7	512				
1 402	7 888 21	1640	188	-	38	6715	0	9	512				
1 403	7 888 21	1640	185	-	25	6715	0	9	512				
1 404	7 888 21	1642	171	-	11	6716	0	23	512				
1 405	7 888 21	1642	113	-	13	6719	0	20	512				
1 406	7 888 21	1643	35907	-	13	5884	0	16	512				
1 407	7 888 21	1645	35722	-	18	5891	0	9	512				
1 408	7 888 21	1645	35472	-	28	5899	0	6	512				
1 409	7 888 21	1647	35176	-	6	5908	0	25	512				
1 410	7 888 21	1647	35225	-	25	5913	0	15	512				
1 411	7 888 21	1648	35034	-	14	5920	0	5	512				
1 412	7 888 21	1697	0	-	0	2690	0	12	512				
1 413	7 888 21	1697	63	-	33	2663	0	18	512				
1 414	7 888 21	1698	35937	-	17	2629	0	37	512				
1 415	7 888 21	1698	35832	-	57	2594	0	29	512				
1 416	7 888 21	1700	0	-	25	2560	0	30	512				

Figure 16. ED AND INSERT listing (part 7).

SENSOR	6	17 888211 20000		SONAR 999CB		M D		50505050 GSOT		PLOT CODE
EDIT MARK CODE NUM	RAN	REP DES	SEN	TIME	ACTUAL BEAR	BEAR ERROR	ADJUST RANGE	ACTUAL RANGE	RANGE ERROR	
1 400	7	888 21		1607	345	-	10482	0-	5	712
1 401	7	888 21		1608	384	-	10471	0-	36	712
1 402	7	888 21		1608	337	-	10460	0-	13	712
1 403	7	888 21		1610	35992	-	10441	0-	36	712
1 404	7	888 21		1610	35200	-	10410	0-	5	712
1 405	7	888 21		1612	34289	-	10379	0-	20	712
1 406	7	888 21		1613	33790	-	12868	0	32	712
1 407	7	888 21		1613	34321	-	12845	0-	5	712
1 408	7	888 21		1615	35183	-	12823	0-	41	712
1 409	7	888 21		1617	35596	-	12802	0-	20	712
1 410	7	888 21		1617	35783	-	12784	0-	39	712
1 411	7	888 21		1618	35847	-	12771	0-	26	712
1 412	7	888 21		1620	35863	-	16969	0-	56	712
1 413	7	888 21		1620	35880	-	16966	0-	53	712
1 414	7	888 21		1622	35895	-	16965	0-	35	712
1 415	7	888 21		1622	35924	-	16964	0-	34	712
1 416	7	888 21		1622	35914	-	16964	0-	34	712
1 417	7	888 21		1623	35886	-	16968	0-	38	712
1 418	7	888 21		1625	35715	-	18659	0-	56	712
1 419	7	888 21		1627	35536	-	18665	0-	15	712
1 420	7	888 21		1627	35310	-	18671	0-	49	712
1 421	7	888 21		1627	35065	-	18676	0-	54	712
1 422	7	888 21		1628	34805	-	18675	0-	53	712
1 424	7	888 21		1632	618	-	8042	0-	62	712
1 425	7	888 21		1633	679	-	8029	0-	74	712
1 426	7	888 21		1633	550	-	8020	0-	65	712
1 427	7	888 21		1635	530	-	8012	0-	57	712
1 428	7	888 21		1635	411	-	8003	0-	64	712
1 429	7	888 21		1637	311	-	7995	0-	65	712
1 452	7	888 21		1662	35749	-	4705	0-	65	712
1 453	7	888 21		1663	35755	-	4669	0-	69	712
1 454	7	888 21		1663	35928	-	4630	0-	30	712
1 455	7	888 21		1665	35961	-	4592	0-	70	712
1 456	7	888 21		1665	35844	-	4542	0-	20	712
1 457	7	888 21		1667	35976	-	4502	0-	102	712

Figure 16. ED AND INSERT listing (part 8).

BEARING LIMITS	-36 TO	0 FOR MARKS	1 THRU	419										
SENSOR	7	17 888412	GFCS 999C		T									
EDIT MARK	CODE	NUM	RAN	REP	DES	SEN	TIME	ACTUAL	BEAR	BEAR	ADJUST	ACTUAL	RANGE	PLUT
									ERROR	ERROR	RANGE	RANGE		CODE
2	1	7	888	41	897	35377	-	2	5268	5268	0	110		
3	3	7	888	41	900	35222	-	247	5012	5012	0	110		
2	4	7	888	41	903	35207	-	15	4795	4795	0	110		
2	5	7	888	41	905	35291	-	33	4701	4701	0	110		
3	6	7	888	41	905	35223	-	115	4654	4654	0	110		
2	7	7	888	41	907	35294	-	36	4557	4557	0	110		
2	9	7	888	41	908	35202	-	36	4461	4461	0	110		
2	10	7	888	41	910	35075	-	33	4393	4393	0	110		
2	11	7	888	41	910	35151	-	26	4322	4322	0	110		
2	12	7	888	41	912	35037	-	29	4275	4275	0	110		
2	13	7	888	41	913	34976	-	10	4113	4113	0	110		
2	14	7	888	41	913	35039	-	6	4042	4042	0	110		
2	15	7	888	41	915	35115	-	23	3946	3946	0	110		
2	16	7	888	41	917	34992	-	17	3874	3874	0	110		
2	17	7	888	41	918	34835	-	19	3780	3780	0	110		
2	18	7	888	41	918	34830	-	22	3710	3710	0	110		
2	19	7	888	41	920	34903	-	19	3663	3663	0	110		
2	20	7	888	41	920	34926	-	9	3592	3592	0	110		
3	21	7	888	41	922	34973	-	977	3543	3543	0	110		
2	22	7	888	41	922	34874	-	16	3497	3497	0	110		
2	402	7	888	41	1757	24943	-	9	3943	3943	0	110		
2	403	7	888	41	1758	24856	-	17	3966	3966	0	110		
2	404	7	888	41	1758	24766	-	16	3991	3991	0	110		
2	405	7	888	41	1758	24683	-	20	4017	4017	0	110		
2	408	7	888	41	1762	24289	-	23	4134	4134	0	110		
2	409	7	888	41	1762	24169	-	16	4166	4166	0	110		
2	410	7	888	41	1763	24076	-	16	4200	4200	0	110		
2	411	7	888	41	1763	23952	-	20	4233	4233	0	110		
2	412	7	888	41	1765	23873	-	25	4270	4270	0	110		
2	413	7	888	41	1765	23737	-	25	4306	4306	0	110		
2	414	7	888	41	1765	23689	-	28	4346	4346	0	110		
2	415	7	888	41	1767	23639	-	26	4383	4383	0	110		
2	416	7	888	41	1767	23594	-	20	4424	4424	0	110		
2	417	7	888	41	1768	23474	-	19	4483	4483	0	110		
2	418	7	888	41	1768	23342	-	22	4545	4545	0	110		
2	419	7	888	41	1770	23258	-	13	4589	4589	0	110		

Figure 16. ED AND INSERT listing (part 9).

RANGE LIMITS		-27 TO		0 FOR MARKS		1 THRU		419			
SENSOR		8		17 888441		GFC5 999C		TP			
EDIT MARK	CODE NUM	KAN	REP	DES	SEN	TIME	ACTUAL	BEAR	IP		
1	5	7	888	44	905	35291	0	4701	4701-	21	110
1	6	7	888	44	905	35223	0	4654	4654-	16	110
1	7	7	888	44	907	35254	0	4557	4557-	16	110
1	9	7	888	44	908	35202	0	4461	4461-	18	110
1	10	7	888	44	910	35075	0	4393	4393-	13	110
1	11	7	888	44	910	35151	0	4322	4322-	13	110
1	12	7	888	44	912	35037	0	4275	4275-	16	110
1	13	7	888	44	913	34976	0	4113	4113-	14	110
1	14	7	888	44	913	35039	0	4042	4042-	12	110
1	15	7	883	44	915	35115	0	3946	3946-	6	110
1	16	7	888	44	917	34992	0	3874	3874-	15	110
1	17	7	888	44	918	34835	0	3780	3780-	16	110
1	18	7	888	44	918	34830	0	3710	3710-	22	110
1	19	7	888	44	920	34903	0	3663	3663-	21	110
1	23	7	888	44	922	34646	0	3355	3355-	15	110
1	24	7	888	44	925	34730	0	3283	3283-	18	110
1	25	7	888	44	927	34768	0	3234	3234-	14	110
1	26	7	888	44	927	34920	0	3073	3073-	13	110
1	27	7	888	44	928	34895	0	3001	3001-	16	110
1	28	7	888	44	930	34595	0	2930	2930-	9	110
1	29	7	888	44	930	34555	0	2883	2883-	17	110
1	401	7	888	44	1757	25057	0	3920	3920-	17	110
1	402	7	888	44	1757	24943	0	3943	3943-	17	110
1	403	7	888	44	1758	24856	0	3966	3966-	12	110
1	404	7	888	44	1758	24766	0	3991	3991-	11	110
1	405	7	888	44	1758	24683	0	4017	4017-	15	110
1	408	7	888	44	1762	24289	0	4134	4134-	14	110
3	409	7	888	44	1762	24109	0	4166	4166-	29	110
1	410	7	888	44	1763	24076	0	4200	4200-	18	110
1	411	7	888	44	1763	23952	0	4233	4233-	13	110
1	412	7	888	44	1765	23873	0	4270	4270-	12	110
1	413	7	888	44	1765	23737	0	4306	4306-	18	110
1	414	7	888	44	1765	23689	0	4346	4346-	20	110
1	415	7	888	44	1767	23639	0	4383	4383-	20	110
1	416	7	888	44	1767	23594	0	4424	4424-	24	110
1	417	7	888	44	1768	23474	0	4483	4483-	19	110
1	418	7	888	44	1768	23342	0	4545	4545-	20	110
1	419	7	888	44	1770	23258	0	4589	4589-	13	110

Figure 16. ED AND INSERT listing (part 10).

BEARING LIMITS -150 TO 100 FOR MARKS WITH PLOT CODE OF 2??
 RANGE LIMITS -20 TO 120 FOR MARKS WITH PLOT CODE OF 2??
 BEARING LIMITS -150 TO 100 FOR MARKS WITH PLOT CODE OF 3??
 RANGE LIMITS -50 TO 120 FOR MARKS WITH PLOT CODE OF 3??
 BEARING LIMITS -150 TO 100 FOR MARKS WITH PLOT CODE OF 4??
 RANGE LIMITS -140 TO 140 FOR MARKS WITH PLOT CODE OF 4??
 BEARING DATA DELETED FROM MARK 304
 BEARING DATA DELETED FROM MARK 306

17 808012	SS RADAR 999A 990															
EDIT MARK	SEN	RAN	REP	DES	TIME	ACTUAL	BEAR	BEAR	ADJUST	ACTUAL	RANGE	RANGE	ERROR	PLOT		
CODE	NUM							ERROR	RANGE	RANGE				CODE		
8		7	888	61	1205	35223		7	6061	6061	59	212				
9		7	888	61	1207	34821	-	11	6048	6048	62	212				
10		7	888	61	1207	34707	-	17	6042	6042	83	212				
11		7	888	61	1208	34561	-	11	6036	6036	29	212				
12		7	888	61	1208	34395	-	5	6031	6031	64	212				
13		7	888	61	1210	34266	-	6	6026	6026	59	212				
14		7	888	61	1210	34174	-	4	6020	6020	85	212				
15		7	888	61	1212	34041	-	21	6014	6014	46	212				
16		7	888	61	1213	33797	-	27	6000	6000	50	212				
17		7	888	61	1213	33720	-	30	5988	5988	57	212				
18		7	888	61	1215	33692	-	12	5979	5979	61	212				
19		7	888	61	1215	33647	-	3	5969	5969	76	212				
20		7	888	61	1217	33580	-	20	5960	5960	0	212				
21		7	888	61	1217	33450	-	30	5950	5950	80	212				
22		7	888	61	1218	33447	-	47	5940	5940	55	212				
23		7	888	61	1218	33412	-	62	5930	5930	65	212				
24		7	888	61	1220	33391	-	21	5921	5921	79	212				
25		7	888	61	1220	33400	-	50	5912	5912	68	212				
26		7	888	61	1222	33383	-	43	5902	5902	18	212				
27		7	888	61	1222	33265	-	5	5889	5889	36	212				
346		7	888	61	1800	24265	-	5	12556	12556-	41	422				
347		7	888	61	1802	24205	-	5	12590	12590	95	422				
348		7	888	61	1802	24082	-	22	12624	12624	41	422				
349		7	888	61	1803	24041	-	11	12658	12658-	33	422				
350		7	888	61	1803	23901	-	11	12689	12689	86	422				
351		7	888	61	1805	23830	-	30	11455	11455-	125	422				
352		7	888	61	1807	23833	-	33	11488	11488	87	422				
353		7	888	61	1807	23853	-	33	11521	11521	29	422				
355		7	888	61	1808	23695	-	15	11589	11589-	89	422				
356		7	888	61	1810	23504	-	34	11658	11658-	63	422				
357		7	888	61	1812	23521	-	31	11693	11693	27	422				
358		7	888	61	1812	23506	-	56	9544	9544-	4	422				
359		7	888	61	1813	23423	-	23	9596	9596-	76	422				
360		7	888	61	1813	23503	-	73	9633	9633-	53	422				
361		7	888	61	1817	23377	-	57	9717	9717-	62	422				
362		7	888	61	1817	23356	-	56	9753	9753-	103	422				
1	363	7	888	61	1818	23319	-	181	9789	9789-	59	422				

Figure 16. ED AND INSERT listing (part 11).

SENSOR	10	17 806611	8000	SS RADAR 999A 99D	EDIT MARK CODE NUM	RAN	SEN REP DES	TIME	ACTUAL BEAR	BEAR ERROR	ADJUST RANGE	ACTUAL RANGE	RANGE ERROR	PLOT CODE	
					8	7	888 61	1205	35223	7	6061	6061	59	212	
					9	7	888 61	1207	34821	-	11	6048	6048	62	212
					10	7	888 61	1207	34707	-	17	6042	6042	83	212
					11	7	888 61	1208	34501	-	11	6036	6036	29	212
					12	7	888 61	1208	34395	-	5	6031	6031	64	212
					13	7	888 61	1210	34266	-	6	6026	6026	59	212
					14	7	888 61	1210	34174	-	4	6020	6020	85	212
					15	7	888 61	1212	34041	-	21	6014	6014	46	212
					16	7	888 61	1213	33797	-	27	6000	6000	50	212
					17	7	888 61	1213	33720	-	30	5988	5988	57	212
					18	7	888 61	1215	33692	-	12	5979	5979	61	212
					19	7	888 61	1215	33647	-	3	5969	5969	76	212
					20	7	888 61	1217	33580	-	20	5960	5960	0	212
					21	7	888 61	1217	33490	-	30	5950	5950	80	212
					22	7	888 61	1218	33447	-	47	5940	5940	55	212
					23	7	888 61	1218	33412	-	62	5930	5930	65	212
					24	7	888 61	1220	33391	-	21	5921	5921	79	212
					25	7	888 61	1220	33400	-	50	5912	5912	68	212
					26	7	888 61	1222	33383	-	43	5902	5902	18	212
					27	7	888 61	1222	33265	-	5	5889	5889	36	212
					28	7	888 61	1223	33137	-	37	5874	5874	51	212
					299	7	888 61	1702	11523	-	63	2069	2069	1	212
					300	7	888 61	1703	11659	-	19	2093	2093	22	212
					301	7	888 61	1703	11650	-	10	2117	2117	3	212
					302	7	888 61	1705	11821	-	51	2141	2141	79	212
					303	7	888 61	1705	11915	-	15	2166	2166	34	212
					304	7	888 61	1707	11710	-	80	2202	2202	28	212
					305	7	888 61	1708	11502	-	2	2237	2237	38	212
					306	7	888 61	1708	11261	-	49	2260	2260	45	212
					307	7	888 61	1710	11264	-	34	2281	2281	74	212
					308	7	888 61	1710	11384	-	24	2302	2302	48	212
					309	7	888 61	1712	11678	-	28	2333	2333	22	212
					311	7	888 61	1713	12593	-	33	2384	2384	11	212
					312	7	888 61	1715	13420	-	50	2450	2450	30	212
					314	7	888 61	1717	13531	-	41	2523	2523	17	212
					315	7	888 61	1717	13623	-	23	2559	2559	41	212
					316	7	888 61	1718	13316	-	6	2595	2595	80	212
					317	7	888 61	1718	12935	-	15	2629	2629	36	212
					318	7	888 61	1720	12963	-	13	2660	2660	40	212
					319	7	888 61	1720	13141	-	41	2691	2691	29	212

[illegible]

Figure 16. ED AND INSERT listing (part 13).

SENSOR	12	17 806611	20000	SS KADAR 999A	990													
EDIT MARK	CODE	NUM	RAN	REP	UES	SEN	TIME	ACTUAL	BEAR	BEAR	ERROR	ADJUST	RANGE	ACTUAL	RANGE	RANGE	ERROR	PLOT
		133	7	888	61		1433	6461	-	11	6331	6331	89	422				
		320	7	888	61		1772	26716	-	16	19452	19452	48	422				
		321	7	888	61		1773	26504	-	6	19459	19459	31	422				
		322	7	888	61		1773	26380	-	10	19466	19466	14	422				
		323	7	888	61		1775	26272	-	72	19489	19489	11	422				
		324	7	888	61		1777	26371	-	31	19500	19500	30	422				
		325	7	888	61		1778	26333	-	17	19513	19513	47	422				
		326	7	888	61		1780	26124	-	16	19533	19533	97	422				
		327	7	888	61		1780	26062	-	12	17546	17546	29	422				
		328	7	888	61		1782	26077	-	27	17558	17558	42	422				
		329	7	888	61		1782	26043	-	7	17569	17569	76	422				
		330	7	888	61		1783	25895	-	55	17583	17583	42	422				
		331	7	888	61		1783	25785	-	25	17596	17596	104	422				
		332	7	888	61		1785	25792	-	22	17621	17621	134	422				
		333	7	888	61		1787	25461	-	11	15350	15350	20	422				
		334	7	888	61		1788	25540	-	50	15367	15367	43	422				
		335	7	888	61		1788	25604	-	54	15385	15385	215	422				
		336	7	888	61		1790	25393	-	7	15404	15404	66	422				
		337	7	888	61		1790	25362	-	12	15424	15424	11	422				
		338	7	888	61		1792	25212	-	12	15447	15447	93	422				
		339	7	888	61		1793	24963	-	17	13413	13413	63	422				
		340	7	888	61		1795	24849	-	1	13442	13442	123	422				
		341	7	888	61		1797	24694	-	6	13490	13490	25	422				
		342	7	888	61		1797	24640	-	10	13519	13519	14	422				
		343	7	888	61		1798	24544	-	26	13550	13550	25	422				
		344	7	888	61		1798	24504	-	4	13580	13580	100	422				
		345	7	888	61		1800	24372	-	12	12525	12525	10	422				
		346	7	888	61		1800	24265	-	5	12556	12556	41	422				
		347	7	888	61		1802	24205	-	5	12590	12590	95	422				
		348	7	888	61		1802	24082	-	22	12624	12624	41	422				
		349	7	888	61		1803	24041	-	11	12658	12658	33	422				
		350	7	888	61		1803	23901	-	11	12689	12689	86	422				
		351	7	888	61		1805	23830	-	30	11455	11455	125	422				
		352	7	888	61		1807	23833	-	33	11488	11488	87	422				
		353	7	888	61		1807	23853	-	33	11521	11521	29	422				
		354	7	888	61		1808	23695	-	15	11589	11589	99	422				
		355	7	888	61		1808	23584	-	34	11658	11658	63	422				
		356	7	888	61		1810	23521	-	31	11693	11693	27	422				
		357	7	888	61		1812	23506	-	56	9544	9544	4	422				
		358	7	888	61		1812	23506	-	56	9544	9544	4	422				
		359	7	888	61		1813	23423	-	23	9596	9596	76	422				
		360	7	888	61		1813	23503	-	73	9633	9633	53	422				
		361	7	888	61		1817	23377	-	57	9717	9717	62	422				
		362	7	888	61		1817	23356	-	56	9753	9753	103	422				
		363	7	888	61		1818	23319	-	181	9789	9789	59	422				

Figure 16. ED AND INSERT listing (part 14).

MARK 13 ANNIHILATED MARK 22 ANNIHILATED PARTIAL REPLACEMENT FROM MARK 17 THRU 17 OF 32749 PARTIAL REPLACEMENT FROM MARK 17 OF - 10 BEARING LIMITS -20 TO 5 FOR MARKS 1 THRU 448									
SENSOR 13	17 868732	PER 999A	A8C -	4	0 -	6	0	9	
EDIT MARK CODE NUM	SEN REP DES	TIME	ACTUAL BEAR	BEAR ERROR	ADJUST RANGE	ACTUAL RANGE	RANGE ERROR	PLOT CODE	
3 3	7 868 73	902	30731	- 114	0	0	0	102	
2 5	7 888 73	903	30744	- 6	0	0	0	102	
3 7	7 888 73	905	31059	- 7	0	0	0	102	
2 8	7 888 73	905	31296	- 16	0	0	0	102	
2 9	7 888 73	907	31520	- 9	0	0	0	102	
3 10	7 888 73	907	31802	- 87	0	0	0	102	
2 11	7 888 73	907	31942	- 15	0	0	0	102	
3 12	7 888 73	908	32204	- 94	0	0	0	102	
3 14	7 888 73	908	32349	- 82	0	0	0	102	
2 15	7 868 73	910	32591	- 10	0	0	0	102	
2 17	7 888 73	910	32749	- 10	0	0	0	102	
2 18	7 888 73	912	32998	- 11	0	0	0	102	
3 19	7 888 73	912	33118	- 12	0	0	0	102	
3 20	7 888 73	912	33318	- 13	0	0	0	102	
3 21	7 888 73	913	33563	- 108	0	0	0	102	
2 23	7 868 73	913	33884	- 9	0	0	0	102	
2 24	7 888 73	915	34006	- 7	0	0	0	102	
3 26	7 888 73	915	34433	- 14	0	0	0	102	
2 27	7 888 73	917	34648	- 9	0	0	0	102	
2 28	7 888 73	917	34871	- 16	0	0	0	102	
2 217	7 888 73	1048	29797	- 7	0	0	0	102	
2 218	7 888 73	1048	29964	- 6	0	0	0	102	
2 219	7 888 73	1048	30168	- 12	0	0	0	102	
2 220	7 888 73	1050	30318	- 10	0	0	0	102	
2 223	7 888 73	1058	31878	- 7	0	0	0	102	
2 435	7 888 73	1225	4984	- 11	0	0	0	102	
2 436	7 888 73	1225	5191	- 8	0	0	0	102	
2 437	7 888 73	1227	5382	- 5011	0	0	0	102	
3 438	7 868 73	1227	5569	- 13	0	0	0	102	
2 439	7 888 73	1227	5727	- 15	0	0	0	102	
2 440	7 888 73	1228	5872	- 13	0	0	0	102	
2 441	7 888 73	1228	6018	- 12	0	0	0	102	
2 442	7 888 73	1228	6148	- 13	0	0	0	102	
2 443	7 868 73	1230	6281	- 12	0	0	0	102	
2 444	7 888 73	1230	6407	- 13	0	0	0	102	
2 445	7 888 73	1230	6512	- 12	0	0	0	102	
2 446	7 868 73	1232	6608	- 12	0	0	0	102	
2 447	7 868 73	1232	6703	- 12	0	0	0	102	
2 448	7 888 73	1232	6796	- 10	0	0	0	102	

Figure 16. ED AND INSERT listing (part 15).

BEARING LIMITS -15 TO 10 FOR MARKS 1 THRU 460
 MARK 227 DELETED FROM COMPUTATIONS

17 888742		PER 999A ABC					9		
EDIT MARK CODE NUM	PAN	SEN REP DES	TIME	ACTUAL BEAR	BEAR ERROR	ADJUST RANGE	ACTUAL RANGE	RANGE ERROR	PLOT CODE
2 224	7	888 74	1060	31807	1	0	0	0	202
2 225	7	888 74	1060	31620	0	0	0	0	202
3 226	7	888 74	1060	31375	11	0	0	0	202
3 227	7	888 74	1062	31036	10	0	0	0	202
3 228	7	888 74	1062	30755	14	0	0	0	202
2 229	7	888 74	1062	30480	2	0	0	0	202
2 230	7	888 74	1063	30264	3	0	0	0	202
2 231	7	888 74	1063	30110	3	0	0	0	202
2 232	7	888 74	1063	29893	7	0	0	0	202
2 233	7	888 74	1065	29701	2	0	0	0	202
2 234	7	888 74	1065	29575	3	0	0	0	202
2 235	7	888 74	1065	29450	4	0	0	0	202
2 236	7	888 74	1067	29297	2	0	0	0	202
2 237	7	888 74	1067	29140	2	0	0	0	202
2 238	7	888 74	1067	28996	2	0	0	0	202
2 239	7	888 74	1068	28863	6	0	0	0	202
2 240	7	888 74	1068	28728	2	0	0	0	202
2 242	7	888 74	1070	28497	1	0	0	0	202
2 243	7	888 74	1070	28402	4	0	0	0	202
2 244	7	888 74	1070	28267	3	0	0	0	202
2 422	7	888 74	1200	34285	-	2	0	0	202
2 423	7	888 74	1200	33983	-	3	0	0	202
2 425	7	888 74	1202	33236	3	0	0	0	202
3 426	7	888 74	1202	32876	18	0	0	0	202
2 427	7	888 74	1203	32656	-	1	0	0	202
2 428	7	888 74	1203	32497	0	0	0	0	202
2 429	7	888 74	1203	32366	0	0	0	0	202
2 430	7	888 74	1205	32313	0	0	0	0	202
3 431	7	888 74	1205	32400	-	102	0	0	202
2 432	7	888 74	1205	32273	1	0	0	0	202
2 433	7	888 74	1207	32222	1	0	0	0	202
2 450	7	888 74	1233	6794	-	2	0	0	202
2 451	7	888 74	1235	6701	-	5	0	0	202
2 452	7	888 74	1235	6586	-	6	0	0	202
2 453	7	888 74	1235	6455	-	4	0	0	202
2 454	7	888 74	1237	6337	-	5	0	0	202
2 457	7	888 74	1238	5944	0	0	0	0	202
2 458	7	888 74	1238	5815	6	0	0	0	202
2 459	7	888 74	1238	5608	6	0	0	0	202
2 460	7	888 74	1240	5486	0	0	0	0	202

Figure 16. ED AND INSERT listing (part 16).

PARTIAL REPLACEMENT FROM MARK 277 THRU 277 OF 8435
 BEARING LIMITS -100 TO 0 FOR MARKS WITH PLOT CODE OF 177
 BEARING LIMITS -100 TO 20 FOR MARKS WITH PLOT CODE OF 277
 MARK 15 DELETED FROM COMPUTATIONS
 MARK 371 DELETED FROM COMPUTATIONS

SENSOR	15	17 868812	PEL ALID 999	99										
EDIT MARK	RAN	REP	DES	SEN	TIME	ACTUAL	BEAR	BEAR	ERROR	ADJUST	ACTUAL	RANGE	RANGE	PLOT
CODE NUM														CODE
2 13	7	888	81	1155	34101	-	51	0	0	0	0	0	0	102
2 14	7	888	81	1157	33886	-	41	0	0	0	0	0	0	102
3 15	7	888	81	1157	33656	-	11	0	0	0	0	0	0	102
3 16	7	888	81	1158	33428	-	120	0	0	0	0	0	0	102
2 17	7	888	81	1158	33311	-	33	0	0	0	0	0	0	102
2 18	7	888	81	1160	33403	-	46	0	0	0	0	0	0	102
2 19	7	888	81	1160	33347	-	45	0	0	0	0	0	0	102
2 21	7	888	81	1162	32837	-	79	0	0	0	0	0	0	102
2 22	7	888	81	1163	32701	-	39	0	0	0	0	0	0	102
2 23	7	888	81	1163	32544	-	33	0	0	0	0	0	0	102
3 24	7	888	81	1165	32258	-	150	0	0	0	0	0	0	102
2 25	7	888	81	1165	32014	-	82	0	0	0	0	0	0	102
2 26	7	888	81	1167	31738	-	63	0	0	0	0	0	0	102
2 27	7	888	81	1167	31633	-	81	0	0	0	0	0	0	102
2 28	7	888	81	1168	31434	-	58	0	0	0	0	0	0	102
2 30	7	888	81	1178	29963	-	65	0	0	0	0	0	0	102
3 31	7	888	81	1178	30057	-	8	0	0	0	0	0	0	102
2 32	7	888	81	1180	30014	-	72	0	0	0	0	0	0	102
2 33	7	888	81	1180	29913	-	70	0	0	0	0	0	0	102
2 34	7	888	81	1182	29821	-	51	0	0	0	0	0	0	102
2 336	7	888	81	1575	24991	-	60	0	0	0	0	0	0	102
2 337	7	888	81	1575	24835	-	60	0	0	0	0	0	0	102
2 338	7	888	81	1575	24681	-	41	0	0	0	0	0	0	102
2 339	7	888	81	1577	24540	-	64	0	0	0	0	0	0	102
2 340	7	888	81	1577	24275	-	45	0	0	0	0	0	0	102
2 341	7	888	81	1578	23782	-	37	0	0	0	0	0	0	102
2 342	7	886	81	1580	23383	-	54	0	0	0	0	0	0	102
2 343	7	888	81	1580	23090	-	60	0	0	0	0	0	0	102
2 344	7	888	81	1582	22788	-	80	0	0	0	0	0	0	102
2 345	7	868	81	1582	22480	-	80	0	0	0	0	0	0	102
2 347	7	888	81	1583	22119	-	43	0	0	0	0	0	0	102
2 348	7	888	81	1585	21993	-	64	0	0	0	0	0	0	102
2 351	7	888	81	1587	21225	-	66	0	0	0	0	0	0	102
2 352	7	888	81	1587	20867	-	64	0	0	0	0	0	0	102
2 353	7	888	81	1588	20524	-	54	0	0	0	0	0	0	102
2 354	7	888	81	1588	20119	-	67	0	0	0	0	0	0	102
2 355	7	868	81	1590	19670	-	76	0	0	0	0	0	0	102
3 356	7	868	81	1590	19477	-	239	0	0	0	0	0	0	102
2 357	7	888	81	1592	18882	-	53	0	0	0	0	0	0	102

Figure 16. ED AND INSERT listing (part 17).

SENSOR	16	17	688822	PEL ALID 999	99					
	EDIT MARK CODE NUM	RAN	REP DES	SEN TIME	ACTUAL BEAR	BEAR ERROR	ADJUST RANGE	ACTUAL RANGE	RANGE ERROR	PLOT CODE
	2 143	7	888 82	1360	748	-	0	0	0	201
	2 144	7	888 82	1360	693	-	0	0	0	201
	2 145	7	888 82	1362	683	-	0	0	0	201
	2 146	7	888 82	1362	911	-	0	0	0	201
	2 147	7	888 82	1363	1037	-	0	0	0	201
	2 148	7	888 82	1363	1182	-	0	0	0	201
	2 149	7	888 82	1363	1454	-	0	0	0	201
	2 150	7	888 82	1365	1826	-	0	0	0	201
	2 151	7	888 82	1365	2201	-	0	0	0	201
	2 152	7	888 82	1367	2545	-	0	0	0	201
	2 153	7	888 82	1367	2913	-	0	0	0	201
	2 154	7	888 82	1367	3333	-	0	0	0	201
	2 155	7	888 82	1368	3689	-	0	0	0	201
	2 156	7	888 82	1368	3897	-	0	0	0	201
	2 157	7	888 82	1370	4044	-	0	0	0	201
	2 158	7	888 82	1370	4235	-	0	0	0	201
	2 159	7	888 82	1372	4302	-	0	0	0	201
	2 160	7	888 82	1372	4375	-	0	0	0	201
	2 161	7	888 82	1372	4439	-	0	0	0	201
	2 162	7	888 82	1373	4467	-	0	0	0	201
	2 163	7	888 82	1373	4577	-	0	0	0	201
	2 274	7	888 82	1497	8213	-	0	0	0	201
	2 275	7	888 82	1497	8289	-	0	0	0	201
	2 276	7	888 82	1497	8290	-	0	0	0	201
	3 277	7	888 82	1498	8435	-	0	0	0	201
	2 279	7	888 82	1500	8849	-	0	0	0	201
	2 280	7	888 82	1500	9078	-	0	0	0	201
	2 281	7	888 82	1502	9350	-	0	0	0	201
	2 282	7	888 82	1502	9629	-	0	0	0	201
	2 283	7	888 82	1503	9852	-	0	0	0	201
	2 284	7	888 82	1503	9982	-	0	0	0	201
	2 286	7	888 82	1505	10576	-	0	0	0	201
	2 363	7	888 82	1597	15156	-	0	0	0	201
	2 364	7	888 82	1598	14904	-	0	0	0	201
	2 365	7	888 82	1598	14950	-	0	0	0	201
	2 367	7	888 82	1600	15619	-	0	0	0	201
	3 369	7	888 82	1602	16276	-	0	0	0	201
	3 371	7	888 82	1603	16955	-	0	0	0	201

Figure 16. ED AND INSERT listing (part 18).

DATA BANK PROGRAMS

COMPUTE SENSOR ERROR PROGRAM

This program uses the output tape of ED AND INSERT. It sectors data automatically from the sensor descriptor and plot codes on the "ED AND INSERT" tape. Data are sectorized by time, bearing, or range. The time sector is 0.20 hour, the bearing is 10 degrees, and range is 1 000 yards (except for sonar-range scales less than 10 000 yards when it is 10 percent of scale). For each sector, the program prints out the number of data points, their average value, standard deviation, and confidence factor. It retains on the tape the number of data points, the sum of X , and the sum of X^2 . Figure 17 shows the report critique function using the output of this program. Figure 18 shows the output of the COMPUTE SENSOR ERROR program. All those statistical values which are used in the written report to analyze sensor performance are checked against those computed by this program (tables 13 through 18). If any deficiencies are found, the reasons for such deficiencies are determined. If the range has made an error, this information is forwarded to range personnel. If mistakes were made in the editing of the data, corrections are made and the data reprocessed.

Figure 19 illustrates the types of printouts produced by this program. For each sensor the first page is a list of interval statistics followed by statistical computations appropriate to the sensor.

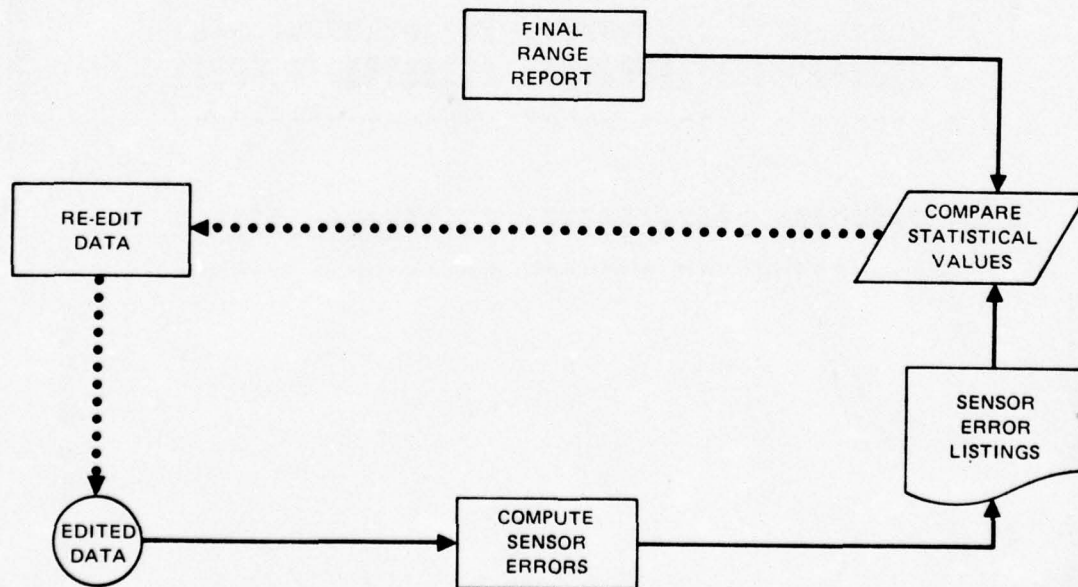


Figure 17. Critique function using COMPUTE SENSOR ERROR output.

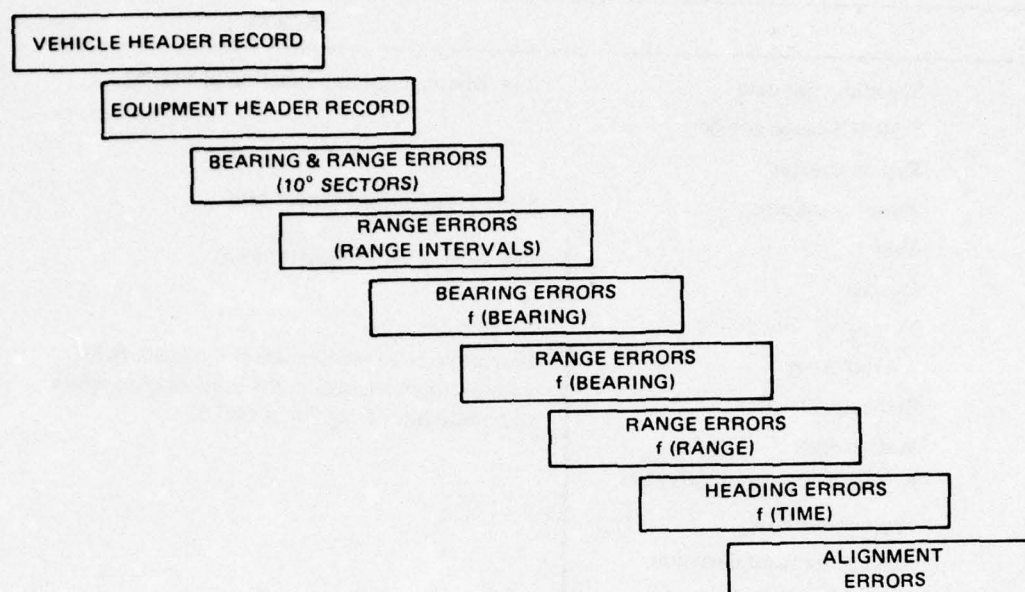


Figure 18. COMPUTE SENSOR ERROR outputs.

TABLE 13. DATA BANK RECORD, GYRO ERRORS

Column	Data	Remarks
1	Specifies type data	7 = gyro error
2	FORACS range number	
3-6	Report number	
7-8	Sensor descriptor	Same as equipment header card
9	Year	
10	Quarter	
18-22	Settled error	Gyro error parameters are five column fields with overpunched sign in the first column, values to hundredths of degrees, ie 000.00
25-29	Average standard deviation	
32-36	Max mean error	
39-43	Excursion from settled error	
46-50	Peak-to-Valley variation (PVV)	
53-57	Midpoint of PVV	

TABLE 14. DATA BANK RECORD, BEARING ERRORS.

Column	Data	Remarks
1	Specifies type data	2 = bearing error as a function of bearing
2	FORACS range number	
3-6	Report number	
7-8	Sensor descriptor	Same as equipment header card
9	Year	} Example: 61 = 1st quarter 1976
10	Quarter	
12-15	Number of data points	} Bearing error parameters are five column fields with overpunched sign in the first column, values to hundredths of degrees, ie 000.00
18-22	Average error	
25-29	Standard deviation	
32-36	Median error	
39-43	Peak-to-Valley variation (PVV)	
46-50	Midpoint of PVV	
53-57	Average standard deviation	
60-64	Maximum error	

TABLE 15. DATA BANK RECORD, RANGE ERRORS.

Column	Data	Remarks
1	Specifies type data	3 = range error as a function of bearing 4 = range error as a function of range
2	FORACS range number	
3-6	Report number	
7-8	Sensor descriptor	Same as equipment header card
9	Year	} Example: 61 = 1st quarter 1976
10	Quarter	
12-15	Number of data points	} Range error parameters are seven column fields with overpunched sign in the first column, values to tenths of yards, ie 000000.0
16-22	Average error	
23-29	Standard deviation	
30-36	Median error	
37-43	Peak-to-Valley variation (PVV)	
44-50	Midpoint of PVV	
51-57	Average standard deviation	
58-64	Maximum error	

TABLE 16. DATA BANK RECORD OF PERISCOPE ALIGNMENT ERROR
AND LOST MOTION FROM CALIBRATION TEST DATA.

Column	Data	Remarks
1	Specifies alignment check	A = Alignment check
2	FORACS range number	
3-6	Report number	
7-8	Field descriptor	
9	Year	
10	Quarter	
18-22	Alignment error	} Bearing error parameters are five column fields with overpunched sign in the first column, values to hundredths of degrees, ie 000.00
25-29	Lost motion	

TABLE 17. DATA BANK RECORD OF PERISCOPE BENCHMARK ALIGNMENT.

Column	Data	Remarks
1	Specifies benchmark checks	"B" = BM check
2	FORACS range number	
3-6	Report number	
7-8	Field descriptor	
9	Year	
10	Quarter	
18-22	Alignment error (Lo power)	} Bearing error parameters are five column fields with overpunched sign in the first column, values to hundredths of degrees, ie 000.00
25-29	Lost motion (Lo power)	
32-36	Alignment error (Hi power)	
39-43	Lost motion (Hi power)	

TABLE 18. DATA BANK RECORD OF GUN FIRE-CONTROL
BENCHMARK CHECKS.

Column	Data	Remarks
1	Specifies benchmark checks	"B" = BM check
2	FORACS range number	
3-6	Report number	
7-8	Sensor descriptor	
9	Year	
10	Quarter	
32-36	Alignment error	} Bearing error parameters are five column fields with overpunched sign in the first column, values to hundredths of degrees, ie 000.00
39-43	Lost Motion error	

LISTING OF GYRO INTERVAL MEANS

GYRO 999 59A JOAN CATHERINE SS 5999 DATE: 12/25/76 FORACS 7 REPORT NO 888, FIELD 11
 17 888112 GYRO 999 99A - 16

START TIME	FINISH TIME	NO OF POINTS	AVERAGE	ST. DEV
1000	1020	4	-0.15	0.01
1020	1040	13	-0.14	0.04
1040	1060	13	-0.15	0.02
1060	1080	15	-0.16	0.05
1080	1100	3	-0.21	0.01
1100	1120	5	-0.23	0.04
1120	1140	15	-0.16	0.03
1140	1160	16	-0.07	0.04
1160	1180	11	-0.07	0.04
1180	1200			
1200	1220			
1220	1240			
1240	1260			
1260	1280	13	-0.04	0.05
1280	1300	21	-0.09	0.06
1300	1320	10	-0.13	0.04
1320	1340	19	-0.19	0.07
1340	1360	18	-0.25	0.06
1360	1380	18	-0.33	0.06
1380	1400	1	-0.32	0.00
1400	1420			
1420	1440	3	-0.05	0.10
1440	1460	14	-0.01	0.07
1460	1480	11	0.09	0.07
1480	1500			
1500	1520	12	0.01	0.06
1520	1540	19	-0.05	0.08
1540	1560	13	-0.06	0.06
1560	1580	16	-0.11	0.06
1580	1600			
1600	1620	19	-0.12	0.05
1620	1640	8	-0.12	0.06
1640	1660	8	-0.15	0.04
1660	1680	16	-0.17	0.05
1680	1700	6	-0.16	0.03
1700	1720			

Figure 19. COMPUTE SENSOR ERROR program output (part 1).

LISTING OF GYRO STATISTICS

GYRO 999 99A JJAN CATHERINE SS 9999 DATE: 12/25/76 FORACS 7 REPORT NO 888, FIELD 11
 17 860112 GYRO 999 99A - 16

SETTLED ERROR (SE)	-0.16	DEGREES
PEAK-TO-VALLEY VARIATION (PVV)	0.42	DEGREES
MAXIMUM EXCURSION FROM SE (MESE)	0.25	DEGREES
MIDPOINT OF PVV (MP)	-0.12	DEGREES
PEAK	0.09	DEGREES
VALLEY	-0.33	DEGREES
MAXIMUM MEAN ERROR (MME)	-0.33	DEGREES
AVERAGE STANDARD DEVIATION (ASD)	0.05	DEGREES

A VALID INTERVAL IS DEFINED AS HAVING AT LEAST FOUR DATA POINTS

THIS PROGRAM RUN ON 29 SEP 1976

THIS IS SENSOR NUMBER 1

Figure 19. COMPUTE SENSOR ERROR program output (part 2).

ERRORS AS A FUNCTION OF BEARING									
SONAR 999CB									
JUAN CATHERINE SS 9999 DATE: 12/25/76 FORACS 7 REPORT NO 888, FIELD 21									
17 888212 10000 SONAR 999CB M D 50505050 GSDT									
BEARING	RANGE ERRORS			BEARING ERRORS			BEARING DATA NOT USED		
	NUMB	AVG	SD	CONF	NUMB	AVG	SD	CONF	
185 TO 195	7	-20.4	6.6	4.9	11	-0.43	0.73	0.43	
195 TO 205	9	-9.1	14.2	9.3	9	-0.93	0.19	0.12	
205 TO 215	10	5.9	7.0	4.3	10	-0.65	0.26	0.17	
215 TO 225	10	11.3	5.5	3.4	10	-0.31	0.14	0.09	
225 TO 235	9	21.8	5.3	3.5	9	-0.40	0.25	0.16	
235 TO 245	10	33.1	9.1	5.7	10	0.11	0.22	0.14	
245 TO 255	11	42.7	11.3	6.7	11	-0.04	0.37	0.22	
255 TO 265	16	49.9	13.0	6.4	15	-0.12	0.30	0.15	
265 TO 275	14	58.0	10.3	5.4	13	-0.46	0.18	0.10	
275 TO 285	13	55.8	9.7	5.3	12	-0.43	0.20	0.11	
285 TO 295	7	28.0	10.6	7.9	7	-0.55	0.24	0.17	
295 TO 305	10	31.4	8.1	5.0	10	-0.27	0.13	0.08	
305 TO 315	19	37.4	7.3	3.3	20	-0.76	0.30	0.13	
315 TO 325	5	51.2	13.7	12.0	1	-0.85	0.00	0.00	
325 TO 335	4	47.8	14.2	13.9	4	-0.74	0.36	0.36	
335 TO 345	26	39.8	19.4	7.2	29	-0.75	0.40	0.14	
345 TO 355	7	24.7	5.4	4.0	7	-1.01	0.47	0.34	
5 TO 15	9	18.9	7.4	4.8	9	-0.59	0.21	0.14	
15 TO 25	5	8.8	14.2	12.5	5	-0.45	0.19	0.16	
25 TO 35	6	-3.2	12.6	10.1	6	-0.72	0.32	0.26	
35 TO 45	8	4.1	9.9	6.9	8	-0.48	0.33	0.23	
45 TO 55	9	6.6	9.7	6.4	8	-0.75	0.12	0.08	
55 TO 65	6	5.2	3.3	2.6	6	-0.78	0.18	0.14	
65 TO 75	13	5.5	11.1	6.1	13	-0.33	0.28	0.15	
75 TO 85	10	27.0	11.0	6.8	10	-0.06	0.26	0.16	
85 TO 95	19	30.5	7.8	3.5	19	-0.26	0.21	0.09	
95 TO 105	9	45.4	11.9	7.8	9	-0.24	0.30	0.19	
105 TO 115	7	45.7	4.4	3.2	7	-0.07	0.27	0.20	
115 TO 125	3	44.0	6.6	7.4	3	-0.13	0.12	0.13	
125 TO 135									BEARING DATA NOT USED
135 TO 145									
145 TO 155									
155 TO 165									
165 TO 175									
175 TO 185									

Figure 19. COMPUTE SENSOR ERROR program output (part 3).

LISTING OF ERROR STATISTICS AS A FUNCTION OF BEARING

SONAR 999CB 17 888212 10000 9999 DATE: 12/25/76 FORACS 7 REPORT NO 888, FIELD 21

JUAN CATHERINE SS SONAR 999CB M D 50505050 650T

RAFFLE LIMITS USED ARE 135 TO 225 DEGREES

SONAR IS IN ACTIVE SQT MODE

MODIFICATION IS INSTALLED

HULL MOUNTED SONAR

SONAR RANGE SCALE IS 10000 YARDS

BEARING ERROR PARAMETERS ARE IN * DEGREES *

	BEARING ERRORS	RANGE ERRORS
PEAK-TO-VALLEY VARIATION (PVV)	1.13	78.4
MIDPOINT OF PVV (MP)	-0.75	18.8
AVERAGE STANDARD DEVIATION (ASD)	0.26	9.8
PEAK	0.11	58.0
VALLEY	-1.01	-20.4
MAXIMUM MEAN ERROR (NME)	-1.01	58.0
AVERAGE STANDARD DEVIATION	0.26	9.8
TOTAL NUMBER OF DATA POINTS	277	293
OVERALL MEAN	-0.46	28.6
OVERALL STANDARD DEVIATION	0.39	22.3
MEDIAN OF ERRORS	-0.45	30.0
NUMBER OF VALID INTERVALS	26	28
WEIGHTED AVERAGE STANDARD DEVIATION	0.26	10.2
AVERAGE OF VALID INTERVAL MEANS	-0.46	25.2
AVERAGE OF VALID INTERVAL ABSOLUTE MEANS	0.47	27.0
MEAN OF ABSOLUTE ERRORS	0.50	31.1

A VALID INTERVAL IS DEFINED AS HAVING AT LEAST FOUR DATA POINTS

Figure 19. COMPUTE SENSOR ERROR program output (part 4).

DATE: 12/25/76 FORACS 7 REPORT NO 888, FIELD 21
SONAR 999CB M D 50505050 GSDT

SONAR 999CB

JOAN CATHERINE SS 9999

SONAR 999CB	M D	50505050	GSDT
-------------	-----	----------	------

17 888211 2500

B E A R I N G E R R O R S		
NUMB	AVG	SD CONF

NUMB	RANGE ERRORS	
	AVG	SD

RANGE	
0 TO	250
250 TO	500
500 TO	750
750 TO	1000
1000 TO	1250
1250 TO	1500
1500 TO	1750
1750 TO	2000
2000 TO	2250
2250 TO	2500
2500 TO	2750

5	-3.4	1.3	1.2
7	-2.7	4.4	3.3
5	14.4	8.6	7.5
3	10.7	7.5	8.5
1	-5.0	0.0	0.0

LISTING OF ERROR STATISTICS AS A FUNCTION OF RANGE FOR THE 2.5K RANGE SCALE
 SONAR 999CB JUAN CATHERINE SS 9999 DATE: 12/25/76 FOMACS 7 REPORT HQ 888, FIELD 21
 17 888211 2500 SONAR 999CB M D 905-5050 GSUT

MODIFICATION IS INSTALLED

 BEARING ERROR PARAMETERS ARE IN * DEGREES *

	BEARING ERRORS	RANGE ERRORS
MAXIMUM BEAN ERROR (HME)	0.00	14.4
AVERAGE STANDARD DEVIATION (ASD)	0.00	4.8
PEAK-TO-VALLEY VARIATION (PVV)	0.00	17.8
MIDPOINT OF PVV (MP)	0.00	5.5
AVERAGE STANDARD DEVIATION	0.00	4.8
PEAK	0.00	14.4
VALLEY	0.00	-3.4
TOTAL NUMBER OF DATA POINTS	0	21
OVERALL MEAN	0.00	3.3
OVERALL STANDARD DEVIATION	0.00	9.6
MEDIAN OF ERRORS	0.00	-2.0
NUMBER OF VALID INTERVALS	0	3
WEIGHTED AVERAGE STANDARD DEVIATION	0.00	5.2
AVERAGE OF VALID INTERVAL MEANS	0.00	2.8
AVERAGE OF VALID INTERVAL ABSOLUTE MEANS	0.00	6.8
MEAN OF ABSOLUTE ERRORS	0.00	7.5

A VALID INTERVAL IS DEFINED AS HAVING AT LEAST FOUR DATA POINTS

THIS PROGRAM RUN ON 29 SEP 1976

THIS IS SENSOR NUMBER 3

Figure 19. COMPUTE SENSOR ERROR program output (part 6).

LISTING OF ERROR STATISTICS AS A FUNCTION OF RANGE FOR THE 5.0K RANGE SCALE
 SONAR 999CB JUAN CATHERINE SS 9999 DATE: 12/25/76 FURACS 7 REPORT NO 888, FIELD 21
 17 888211 5000 SONAR 999CB M D 50505050 GSUT

MODIFICATION IS INSTALLED

BEARING ERROR PARAMETERS ARE IN DEGREES

	BEARING ERRORS	RANGE ERRORS
MAXIMUM MEAN ERROR (MME)	0.00	21.0
AVERAGE STANDARD DEVIATION (ASD)	0.00	9.5
PEAK-TO-VALLEY VARIATION (PVV)	0.00	38.8
MIDPOINT OF PVV (MP)	0.00	1.6
AVERAGE STANDARD DEVIATION	0.00	9.5
PEAK	0.00	21.0
VALLEY	0.00	-17.8
TOTAL NUMBER OF DATA POINTS	0	31
OVERALL MEAN	0.00	19.3
OVERALL STANDARD DEVIATION	0.00	15.2
MEDIAN OF ERRORS	0.00	20.0
NUMBER OF VALID INTERVALS	0	5
WEIGHTED AVERAGE STANDARD DEVIATION	0.00	8.4
AVERAGE OF VALID INTERVAL MEANS	0.00	11.3
AVERAGE OF VALID INTERVAL ABSOLUTE MEANS	0.00	18.6
MEAN OF ABSOLUTE ERRORS	0.00	18.9

A VALID INTERVAL IS DEFINED AS HAVING AT LEAST FOUR DATA POINTS

THIS PROGRAM RUN ON 29 SEP 1976

THIS IS STATUS NUMBER 4

Figure 19. COMPUTE SENSOR ERROR program output (part 8).

DATE: 12/25/76 FORACS 7 REPORT NO 888, FIELD 21
SONAR 999CB M D 50505050 GSOT

RANGE	RANGE ERRORS		BEARING ERRORS	
	NUMB	AVG	NUMB	AVG
0 TO 1000				
1000 TO 2000				
2000 TO 3000	5	-25.2		
3000 TO 4000			8.8	
4000 TO 5000				
5000 TO 6000	6	12.7		
6000 TO 7000			6.0	
7000 TO 8000	6	12.0		
8000 TO 9000			6.1	
9000 TO 10000	7	69.4		
10000 TO 11000	8	69.8	4.5	
			8.2	

Figure 19. COMPUTE SENSOR ERROR program output (part 9).

JULIAN CATHERINE SS 9999 DATE: 4/25/76 FORACS 7 REPORT NO 688, FIELD 21
17 888211 10000 SONAR 999CB M D 50505050 GSOT

```
*****
# DEGREES
*****

GEARING ERROR PARAMETERS ARE IN
```

BEAKING ERRORS	RANGE ERRORS
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
10	10
11	11
12	12
13	13
14	14
15	15
16	16
17	17
18	18
19	19
20	20
21	21
22	22
23	23
24	24
25	25
26	26
27	27
28	28
29	29
30	30
31	31
32	32
33	33
34	34
35	35
36	36
37	37
38	38
39	39
40	40
41	41
42	42
43	43
44	44
45	45
46	46
47	47
48	48
49	49
50	50
51	51
52	52
53	53
54	54
55	55
56	56
57	57
58	58
59	59
60	60
61	61
62	62
63	63
64	64
65	65
66	66
67	67
68	68
69	69
70	70
71	71
72	72
73	73
74	74
75	75
76	76
77	77
78	78
79	79
80	80
81	81
82	82
83	83
84	84
85	85
86	86
87	87
88	88
89	89
90	90
91	91
92	92
93	93
94	94
95	95
96	96
97	97
98	98
99	99
100	100

MAXIMUM MEAN ERROR (MME)
AVERAGE STANDARD DEVIATION (ASD)

PEAK-TO-VALLEY VARIATION (PVV)
MIDPOINT OF PVV (MP)
AVERAGE STANDARD DEVIATION

PEAK
VALLEY

TOTAL NUMBER OF DATA POINTS	OVERALL MEAN	OVERALL STANDARD DEVIATION	MEDIAN OF ERRORS
10	1.00	0.00	1.00
20	1.00	0.00	1.00
30	1.00	0.00	1.00
40	1.00	0.00	1.00
50	1.00	0.00	1.00
60	1.00	0.00	1.00
70	1.00	0.00	1.00
80	1.00	0.00	1.00
90	1.00	0.00	1.00
100	1.00	0.00	1.00

	NUMBER OF VALID INTERVALS	WEIGHTED AVERAGE STANDARD DEVIATION	AVERAGE OF VALID INTERVAL MEANS	AVERAGE OF VALID INTERVAL ABSOLUTE MEANS
1	10	0.0000	0.0000	0.0000
2	10	0.0000	0.0000	0.0000
3	10	0.0000	0.0000	0.0000
4	10	0.0000	0.0000	0.0000
5	10	0.0000	0.0000	0.0000
6	10	0.0000	0.0000	0.0000
7	10	0.0000	0.0000	0.0000
8	10	0.0000	0.0000	0.0000
9	10	0.0000	0.0000	0.0000
10	10	0.0000	0.0000	0.0000
11	10	0.0000	0.0000	0.0000
12	10	0.0000	0.0000	0.0000
13	10	0.0000	0.0000	0.0000
14	10	0.0000	0.0000	0.0000
15	10	0.0000	0.0000	0.0000
16	10	0.0000	0.0000	0.0000
17	10	0.0000	0.0000	0.0000
18	10	0.0000	0.0000	0.0000
19	10	0.0000	0.0000	0.0000
20	10	0.0000	0.0000	0.0000
21	10	0.0000	0.0000	0.0000
22	10	0.0000	0.0000	0.0000
23	10	0.0000	0.0000	0.0000
24	10	0.0000	0.0000	0.0000
25	10	0.0000	0.0000	0.0000
26	10	0.0000	0.0000	0.0000
27	10	0.0000	0.0000	0.0000
28	10	0.0000	0.0000	0.0000
29	10	0.0000	0.0000	0.0000
30	10	0.0000	0.0000	0.0000
31	10	0.0000	0.0000	0.0000
32	10	0.0000	0.0000	0.0000
33	10	0.0000	0.0000	0.0000
34	10	0.0000	0.0000	0.0000
35	10	0.0000	0.0000	0.0000
36	10	0.0000	0.0000	0.0000
37	10	0.0000	0.0000	0.0000
38	10	0.0000	0.0000	0.0000
39	10	0.0000	0.0000	0.0000
40	10	0.0000	0.0000	0.0000
41	10	0.0000	0.0000	0.0000
42	10	0.0000	0.0000	0.0000
43	10	0.0000	0.0000	0.0000
44	10	0.0000	0.0000	0.0000
45	10	0.0000	0.0000	0.0000
46	10	0.0000	0.0000	0.0000
47	10	0.0000	0.0000	0.0000
48	10	0.0000	0.0000	0.0000
49	10	0.0000	0.0000	0.0000
50	10	0.0000	0.0000	0.0000
51	10	0.0000	0.0000	0.0000
52	10	0.0000	0.0000	0.0000
53	10	0.0000	0.0000	0.0000
54	10	0.0000	0.0000	0.0000
55	10	0.0000	0.0000	0.0000
56	10	0.0000	0.0000	0.0000
57	10	0.0000	0.0000	0.0000
58	10	0.0000	0.0000	0.0000
59	10	0.0000	0.0000	0.0000
60	10	0.0000	0.0000	0.0000
61	10	0.0000	0.0000	0.0000
62	10	0.0000	0.0000	0.0000
63	10	0.0000	0.0000	0.0000
64	10	0.0000	0.0000	0.0000
65	10	0.0000	0.0000	0.0000
66	10	0.0000	0.0000	0.0000
67	10	0.0000	0.0000	0.0000
68	10	0.0000	0.0000	0.0000
69				

MEAN OF ABSOLUTE ERRORS

A VALID INTERVAL IS DEFINED AS HAVING AT LEAST FOUR DATA POINTS

THIS PROGRAM RUN ON 29 SEP 1976

THIS IS SENSOR NUMBER

Figure 19. COMPUTE SENSOR ERROR program output (part 10).

DATE: 12/25/76 FORACS 7 REPORT NO 888, FIELD 21
SONAR 999CB M D 50505050 GSDT

RANGE	RANGE ERRORS		BEARING ERRORS	
	NUMB	AVG	SD	CONF
0 TO 1000				
1000 TO 2000				
2000 TO 3000				
3000 TO 4000				
4000 TO 5000	6	-59.3	29.9	23.9
5000 TO 6000				
6000 TO 7000				
7000 TO 8000	1	-65.0	0.0	0.0
8000 TO 9000	5	-64.4	6.2	5.4
9000 TO 10000				
10000 TO 11000	6	-19.2	14.2	11.4
11000 TO 12000				
12000 TO 13000	6	-16.5	27.2	21.7
13000 TO 14000				
14000 TO 15000				
15000 TO 16000				
16000 TO 17000	6	-41.7	10.1	8.1
17000 TO 18000				
18000 TO 19000	5	-45.4	17.2	15.1
19000 TO 20000				
20000 TO 21000				

Figure 19. COMPUTE SENSOR ERROR program output (part 11).

LISTING OF ERROR STATISTICS AS A FUNCTION OF RANGE FOR THE 20.0K RANGE SCALE
 SONAR 999CB JOAN CATHERINE SS 9999 DATE: 12/25/76 FORACS 7 REPORT NU 888, FIELD 21
 17 888211 20000 SONAR 999CB M 0 20505050 GSOT

MODIFICATION IS INSTALLED

BEARING ERROR PARAMETERS ARE IN

 * DEGREES *

	BEARING ERRORS	RANGE ERRORS
MAXIMUM MEAN ERROR (MME)	0.00	-64.4
AVERAGE STANDARD DEVIATION (ASD)	0.00	17.5
PEAK-TO-VALLEY VARIATION (PVV)	0.00	47.9
MIDPOINT OF PVV (MP)	0.00	-40.4
AVERAGE STANDARD DEVIATION	0.00	17.5
PEAK	0.00	-16.5
VALLEY	0.00	-64.4
TOTAL NUMBER OF DATA POINTS	0	35
OVERALL MEAN	0.00	-41.0
OVERALL STANDARD DEVIATION	0.00	26.0
MEDIAN OF ERRORS	0.00	-39.0
NUMBER OF VALID INTERVALS	0	6
WEIGHTED AVERAGE STANDARD DEVIATION	0.00	18.0
AVERAGE OF VALID INTERVAL MEANS	0.00	-41.1
AVERAGE OF VALID INTERVAL ABSOLUTE MEANS	0.00	41.1
MEAN OF ABSOLUTE ERRORS	0.00	42.3

A VALID INTERVAL IS DEFINED AS HAVING AT LEAST FOUR DATA POINTS

THIS PROGRAM RUN ON 29 SEP 1976

THIS IS SENSOR NUMBER 6

Figure 19. COMPUTE SENSOR ERROR program output (part 12).

FURACS 7 REPORT NO 888, FIELD 41

DATE: 12/25/76

JUAN CATHERINE SS 9999
17 888412

GFC5 949C

RANGE ERRORS			BEARING ERRORS				
NUMB	AVG	SD	CONF	NUMB	AVG	SD	CONF

BEARING	NUMB	AVG	SD	CONF	NUMB	AVG	SD	CONF
185 TO 195					3	-0.18	0.05	0.05
195 TO 205					9	-0.22	0.04	0.03
205 TO 215					9	-0.17	0.04	0.02
215 TO 225					5	-0.19	0.07	0.06
225 TO 235					13	-0.21	0.04	0.02
235 TO 245					7	-0.23	0.09	0.07
245 TO 255					2	-0.12	0.04	0.06
255 TO 265					11	-0.21	0.09	0.05
265 TO 275					7	-0.17	0.07	0.06
275 TO 285					2	-0.17	0.06	0.09
285 TO 295					5	-0.17	0.05	0.05
295 TO 305					48	-0.19	0.08	0.02
305 TO 315					70	-0.19	0.07	0.02
315 TO 325					21	-0.18	0.06	0.02
325 TO 335					24	-0.17	0.07	0.03
335 TO 345					26	-0.18	0.06	0.02
345 TO 355					8	-0.17	0.06	0.04
355 TO 5					7	-0.19	0.05	0.04
5 TO 15					5	-0.18	0.06	0.05
15 TO 25					8	-0.25	0.05	0.04
25 TO 35					12	-0.21	0.06	0.04
35 TO 45					10	-0.19	0.09	0.06
45 TO 55					7	-0.23	0.05	0.04
55 TO 65					6	-0.23	0.04	0.03
65 TO 75					4	-0.17	0.08	0.08
75 TO 85								
85 TO 95								
95 TO 105								
105 TO 115					5	-0.17	0.07	0.06
115 TO 125					1	-0.22	0.00	0.00
125 TO 135								
135 TO 145								

LISTING OF ERROR STATISTICS AS A FUNCTION OF BEARING

GFCS 999C SS 9999 DATE: 12/25/76 FURACS 7 REPORT NO 889, FIELD 41

JULIAN CATHETERINE 17 688412 GFCS 999C T

WADAR IN AUTO TRACK MODE

BEARING ERROR PARAMETERS ARE IN * MINUTES *

	BEARING ERRORS	RANGE ERRORS
PEAK-TO-VALLEY VARIATION (PVV)	4.72	0.0
MIDPOINT OF PVV (MP)	-12.49	0.0
AVERAGE STANDARD DEVIATION (ASD)	3.78	0.0
PEAK	-10.13	0.0
VALLEY	-14.85	0.0
MAXIMUM MEAN ERROR (MME)	-14.85	0.0
AVERAGE STANDARD DEVIATION	3.78	0.0
TOTAL NUMBER OF DATA POINTS	335	0
OVERALL MEAN	-11.43	0.0
OVERALL STANDARD DEVIATION	4.31	0.0
MEDIAN OF ERRORS	-11.40	0.0
NUMBER OF VALID INTERVALS	23	0
WEIGHTED AVERAGE STANDARD DEVIATION	3.84	0.0
AVERAGE OF VALID INTERVAL MEANS	-11.07	0.0
AVERAGE OF VALID INTERVAL ABSOLUTE MEANS	11.07	0.0
MEAN OF ABSOLUTE ERRORS	11.43	0.0

A VALID INTERVAL IS DEFINED AS HAVING AT LEAST FOUR DATA POINTS

THIS PROGRAM RUN ON 29 SEP 1976

THIS IS SENSOR NUMBER 7

Figure 19. COMPUTE SENSOR ERROR program output (part 14).

DATE: 12/25/76 FORACS 7 REPORT NO 808, FIELD 44
GFC5 999C TP

RANGE		RANGE ERRORS		BEARING ERRORS		CONF	
NUMB	AVG	SD	CONF	NUMB	AVG	SD	CONF
0 TO 1000	-14.0	3.8	2.8				
1000 TO 2000	-13.3	4.1	0.8				
2000 TO 3000	-15.5	4.4	0.8				
3000 TO 4000	-15.9	4.2	1.0				
4000 TO 5000	-16.4	4.1	1.5				
5000 TO 6000	-16.7	4.4	1.9				
6000 TO 7000	-17.0	0.0	0.0				
7000 TO 8000							
8000 TO 9000							
9000 TO 10000							
10000 TO 11000							

Figure 19. COMPUTE SENSOR ERROR program output (part 15).

17 888441

A VALID INTERVAL IS DEFINED AS HAVING AT LEAST FOUR DATA POINTS

Figure 19. COMPUTE SENSOR ERROR program output (part 16).

ERRORS AS A FUNCTION OF BEARING									
SS RADAR 999A 99D					JUAN CATHERINE SS 9999				
					DATE: 12/25/76				
					SS RADAR 999A 99D				
					17 888612				
R A N G E					B E A R I N G				
E R R O R S					E R R O R S				
BEARING	NUMB	AVG	SD	CONF	NUMB	AVG	SD	CONF	
165 TO 195	17	14.9	58.9	28.0	16	-0.26	0.29	0.14	
195 TO 205	30	12.7	53.9	19.3	30	-0.20	0.22	0.08	
205 TO 215	16	32.3	47.8	23.4	16	0.07	0.19	0.09	
215 TO 225	17	45.8	39.4	18.7	18	-0.02	0.39	0.18	
225 TO 235	14	28.9	18.4	9.6	14	0.06	0.31	0.16	
235 TO 245	18	44.1	21.4	9.9	19	-0.32	0.21	0.10	
245 TO 255	11	46.0	33.5	19.8	11	-0.30	0.29	0.17	
255 TO 265	7	51.0	26.8	19.9	7	-0.19	0.22	0.16	
265 TO 275	8	62.0	21.7	15.1	8	-0.05	0.18	0.13	
275 TO 285	10	61.8	19.2	11.9	11	0.03	0.33	0.19	
285 TO 295	20	61.3	25.4	11.1	20	-0.16	0.28	0.12	
295 TO 305	11	54.3	22.4	13.3	11	-0.14	0.13	0.07	
305 TO 315	12	62.9	14.2	8.0	12	-0.34	0.25	0.14	
315 TO 325	8	72.3	27.8	19.3	7	-0.21	0.13	0.10	
325 TO 335	10	55.1	32.2	19.9	10	0.23	0.40	0.25	
335 TO 345	5	51.2	30.1	26.4	4	0.32	0.26	0.25	
345 TO 355	7	23.7	25.8	19.1	7	0.01	0.29	0.22	
5 TO 15	8	41.5	36.8	25.5	8	-0.50	0.28	0.19	
15 TO 25	11	31.4	26.9	15.9	11	-0.41	0.37	0.22	
25 TO 35	10	49.5	25.5	15.8	10	-0.10	0.42	0.26	
35 TO 45	12	61.4	24.0	13.6	13	-0.19	0.23	0.13	
45 TO 55	8	57.9	22.2	15.4	7	-0.48	0.11	0.08	
55 TO 65	11	43.8	27.6	16.3	11	-0.35	0.24	0.14	
65 TO 75	11	40.9	17.9	10.6	11	-0.71	0.45	0.27	
75 TO 85	10	43.7	19.2	11.9	9	-0.70	0.30	0.20	
85 TO 95	14	40.4	26.3	13.8	13	-0.39	0.25	0.14	
95 TO 105	9	37.7	31.6	20.7	9	-0.35	0.29	0.19	
105 TO 115	8	47.8	26.1	18.1	8	-0.40	0.16	0.11	
115 TO 125									
125 TO 135									
135 TO 145									
145 TO 155									
155 TO 165									
165 TO 175									
175 TO 185									

Figure 19. COMPUTE SENSOR ERROR program output (part 17).

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LISTING OF ERROR STATISTICS AS A FUNCTION OF BEARING
SS RADAR 999A 990          SS 9999  DATE: 12/25/76  F06ACS 7 REPORT NO 888, FIELD 61
                        SS RADAR 999A 990
                        17 88861Z
                        *****
                        BEARING ERROR PARAMETERS ARE IN * DEGREES *
                        *****
PEAK-TO-VALLEY VARIATION (PVV)
MIDPOINT OF PVV (MP)
AVERAGE STANDARD DEVIATION (ASD)
PEAK
VALLEY
MAXIMUM MEAN ERROR (MME)
AVERAGE STANDARD DEVIATION
TOTAL NUMBER OF DATA POINTS
OVERALL MEAN
OVERALL STANDARD DEVIATION
MEDIAN OF ERRORS
NUMBER OF VALID INTERVALS
WEIGHTED AVERAGE STANDARD DEVIATION
AVERAGE OF VALID INTERVAL MEANS
AVERAGE OF VALID INTERVAL ABSOLUTE MEANS
MEAN OF ABSOLUTE ERRORS

```

	BEARING ERRORS	RANGE ERRORS
PEAK-TO-VALLEY VARIATION (PVV)	1.03	57.6
MIDPOINT OF PVV (MP)	-0.20	42.5
AVERAGE STANDARD DEVIATION (ASD)	0.27	28.7
PEAK	0.32	72.3
VALLEY	-0.71	12.7
MAXIMUM MEAN ERROR (MME)	-0.71	72.3
AVERAGE STANDARD DEVIATION	0.27	28.7
TOTAL NUMBER OF DATA POINTS	331	333
OVERALL MEAN	-0.21	42.8
OVERALL STANDARD DEVIATION	0.35	35.9
MEDIAN OF ERRORS	-0.23	46.3
NUMBER OF VALID INTERVALS	28	28
WEIGHTED AVERAGE STANDARD DEVIATION	0.27	32.2
AVERAGE OF VALID INTERVAL MEANS	-0.22	42.6
AVERAGE OF VALID INTERVAL ABSOLUTE MEANS	0.27	45.6
MEAN OF ABSOLUTE ERRORS	0.33	48.9

A VALID INTERVAL IS DEFINED AS HAVING AT LEAST FOUR DATA POINTS

THIS PROGRAM RUN ON 29 SEP 1976

THIS IS SENSOR NUMBER 9

Figure 19. COMPUTE SENSOR ERROR program output (part 18).

SS RADAR 999A 99D JOAN CATHERINE SS 9999 DATE: 12/25/76 FORACS 7 REPORT NO 888, FIELD 61

[illegible]

Figure 19. COMPUTE SENSOR ERROR program output (part 19).

SS RADAR 999A 99D

17 882611 10000

66

Figure 19. COMPUTE SENSOR ERROR program output (part 21).

LISTING OF ERROR STATISTICS AS A FUNCTION OF RANGE FOR THE 10.0K RANGE SCALE
 SS RADAR 999A 99D JAN CATHERINE SS 9999 DATE: 12/25/76 FURACS 7 REPORT NO 808, FIELD 61
 17 080611 10000 SS RADAR 999A 99D

 BEARING ERROR PARAMETERS ARE IN * DEGREES *

	BEARING ERRORS	RANGE ERRORS
MAXIMUM MEAN ERROR (MME)	-0.61	59.4
AVERAGE STANDARD DEVIATION (ASD)	0.26	25.8

PEAK-TO-VALLEY VARIATION (PVV)	0.65	49.2
MIDPOINT OF PVV (MP)	-0.29	34.8
AVERAGE STANDARD DEVIATION	0.26	25.8
PEAK	0.03	59.4
VALLEY	-0.61	10.2

TOTAL NUMBER OF DATA POINTS	154	154
OVERALL MEAN	-0.18	38.3
OVERALL STANDARD DEVIATION	0.38	28.0
MEDIAN OF ERRORS	-0.21	36.5

	B	B
NUMBER OF VALID INTERVALS	8	8
WEIGHTED AVERAGE STANDARD DEVIATION	0.28	25.2
AVERAGE OF VALID INTERVAL MEANS	-0.36	41.0
AVERAGE OF VALID INTERVAL ABSOLUTE MEANS	0.37	41.3

MEAN OF ABSOLUTE ERRORS	0.34	40.4
-------------------------	------	------

A VALID INTERVAL IS DEFINED AS HAVING AT LEAST FOUR DATA POINTS

THIS PROGRAM RUN ON 29 SEP 1976

THIS IS SENSOR NUMBER 11

Figure 19. COMPUTE SENSOR ERROR program output (part 22).

SS RADAR 999A	99D	JUAN CATHERINE	SS	9999	DATE: 12/25/76	FORACS 7 REPORT NO	888, FIELD 61
		17 888611	20000		SS RADAR 999A	99D	

RANGE		RANGE		RANGE		BEARING		ERRORS	
NUMB	AVG	SD	CONF	NUMB	AVG	SD	CONF		
0 TO 1000									
1000 TO 2000									
2000 TO 3000									
3000 TO 4000									
4000 TO 5000									
5000 TO 6000									
6000 TO 7000									
7000 TO 8000									
8000 TO 9000									
9000 TO 10000									
10000 TO 11000									
11000 TO 12000									
12000 TO 13000									
13000 TO 14000									
14000 TO 15000									
15000 TO 16000									
16000 TO 17000									
17000 TO 18000									
18000 TO 19000									
19000 TO 20000									
20000 TO 21000									

Figure 19. COMPUTE SENSOR ERROR program output (part 23).

LISTING OF ERROR STATISTICS AS A FUNCTION OF RANGE FOR THE 20.0K RANGE SCALE

SS RAJAR 999A 990 JUAN CATHIERE SS 9999 DATE: 12/25/76 FOMACS / REPORT NO 880, FIELD 01

LT 880011 20000 SS RAJAR 999A 990

 BEARING ERROR PARAMETERS ARE IN * DEGREES *

	BEARING ERRORS	RANGE ERRORS
MAXIMUM MEAN ERROR (HME)	-0.53	71.2
AVERAGE STANDARD DEVIATION (ASD)	0.19	51.5
PEAK-TO-VALLEY VARIATION (PVV)	0.59	130.7
MIDPOINT OF PVV (MP)	-0.23	5.8
AVERAGE STANDARD DEVIATION	0.19	51.5
PEAK	0.06	71.2
VALLEY	-0.53	-59.5
TOTAL NUMBER OF DATA POINTS	43	43
OVERALL MEAN	-0.17	18.1
OVERALL STANDARD DEVIATION	0.20	65.3
MEDIAN OF ERRORS	-0.12	27.0
NUMBER OF VALID INTERVALS	7	7
WEIGHTED AVERAGE STANDARD DEVIATION	0.20	50.1
AVERAGE OF VALID INTERVAL MEANS	-0.18	16.8
AVERAGE OF VALID INTERVAL ABSOLUTE MEANS	0.20	90.2
MEAN OF ABSOLUTE ERRORS	0.24	57.2

A VALID INTERVAL IS DEFINED AS HAVING AT LEAST FOUR DATA POINTS

THIS PROGRAM RUN ON 29 SEP 1976

THIS IS SENSOR NUMBER 12

Figure 19. COMPUTE SENSOR ERROR program output (part 24).

ERRORS AS A FUNCTION OF BEARING
 PER 999A ABC JOAN CATHERINE SS 9999 DATE: 12/25/76 FORACS 7 REPORT NU 888, FIELD 73
 17 888732 PER 999A ABC - 4 0 - 6 0 9

BEARING	RANGE			BEARING			ERRORS		
	NUMB	AVG	SD	CONF	NUMB	AVG	SD	CONF	
185 TO 195	3	-0.05	0.03	0.03	3	-0.05	0.03	0.03	
195 TO 205	8	-0.06	0.03	0.02	8	-0.06	0.03	0.02	
205 TO 215	8	-0.09	0.02	0.01	8	-0.09	0.02	0.01	
215 TO 225	6	-0.08	0.01	0.01	6	-0.08	0.01	0.01	
225 TO 235	6	-0.07	0.03	0.03	6	-0.07	0.03	0.03	
235 TO 245	2	-0.06	0.00	0.00	2	-0.06	0.00	0.00	
245 TO 255	4	-0.08	0.05	0.04	4	-0.08	0.05	0.04	
255 TO 265	5	-0.08	0.03	0.03	5	-0.08	0.03	0.03	
265 TO 275	5	-0.10	0.04	0.03	5	-0.10	0.04	0.03	
275 TO 285	6	-0.06	0.03	0.02	6	-0.06	0.03	0.02	
285 TO 295	7	-0.08	0.02	0.01	7	-0.08	0.02	0.01	
295 TO 305	4	-0.09	0.03	0.03	4	-0.09	0.03	0.03	
305 TO 315	2	-0.11	0.07	0.10	2	-0.11	0.07	0.10	
315 TO 325	3	-0.10	0.04	0.05	3	-0.10	0.04	0.05	
325 TO 335	2	-0.10	0.01	0.01	2	-0.10	0.01	0.01	
335 TO 345	2	-0.08	0.01	0.02	2	-0.08	0.01	0.02	
345 TO 355	4	-0.05	0.04	0.04	4	-0.05	0.04	0.04	
355 TO 5	7	-0.04	0.02	0.02	7	-0.04	0.02	0.02	
5 TO 15	6	-0.04	0.03	0.03	6	-0.04	0.03	0.03	
15 TO 25	4	-0.03	0.04	0.04	4	-0.03	0.04	0.04	
25 TO 35	6	-0.06	0.02	0.02	6	-0.06	0.02	0.02	
35 TO 45	4	-0.08	0.01	0.01	4	-0.08	0.01	0.01	
45 TO 55	4	-0.09	0.01	0.01	4	-0.09	0.01	0.01	
55 TO 65	6	-0.13	0.01	0.01	6	-0.13	0.01	0.01	
65 TO 75	4	-0.11	0.01	0.01	4	-0.11	0.01	0.01	
75 TO 85	4	-0.10	0.01	0.01	4	-0.10	0.01	0.01	
85 TO 95	3	-0.09	0.01	0.01	3	-0.09	0.01	0.01	
95 TO 105	4	-0.06	0.01	0.01	4	-0.06	0.01	0.01	
105 TO 115	8	-0.06	0.01	0.01	8	-0.06	0.01	0.01	
115 TO 125	6	-0.05	0.02	0.02	6	-0.05	0.02	0.02	
125 TO 135	5	-0.05	0.02	0.01	5	-0.05	0.02	0.01	
135 TO 145	7	-0.05	0.03	0.02	7	-0.05	0.03	0.02	
145 TO 155	7	-0.07	0.02	0.02	7	-0.07	0.02	0.02	
155 TO 165	4	-0.05	0.01	0.01	4	-0.05	0.01	0.01	
165 TO 175	7	-0.06	0.04	0.03	7	-0.06	0.04	0.03	
175 TO 185	7	-0.07	0.03	0.02	7	-0.07	0.03	0.02	

Figure 19. COMPUTE SENSOR ERROR program output (part 25).

LISTING OF ERROR STATISTICS AS A FUNCTION OF BEARING

PER 999A ABC SS 9999 DATE: 12/25/76 FORACS 7 REPORT NO 888, FIELD 73

JUAN CATHERINE 17 883732 PER 999A ABC - 4 3 - 6 3 9

 BEARING ERROR PARAMETERS ARE IN * MINUTES *

	BEARING ERRORS	PAGE ERRORS
PEAK-TO-VALLEY VARIATION (PPV)	6.00	0.0
MIDPOINT OF PVV (MP)	-4.80	0.0
AVERAGE STANDARD DEVIATION (ASD)	1.44	0.0
PEAK	-1.80	0.0
VALLEY	-7.80	0.0
MAXIMUM MEAN ERROR (MME)	-7.80	0.0
AVERAGE STANDARD DEVIATION	1.44	0.0
TOTAL NUMBER OF DATA POINTS	180	0
OVERALL MEAN	-4.31	0.0
OVERALL STANDARD DEVIATION	1.96	0.0
MEDIAN OF ERRORS	-4.20	0
NUMBER OF VALID INTERVALS	32	0
WEIGHTED AVERAGE STANDARD DEVIATION	1.42	0.0
AVERAGE OF VALID INTERVAL MEANS	-4.33	0.0
AVERAGE OF VALID INTERVAL ABSOLUTE MEANS	4.33	0.0
MEAN OF ABSOLUTE ERRORS	4.33	0.0

FOR PERISCOPE CALIBRATION, A VALID INTERVAL IS ONE WITH A MINIMUM OF THREE DATA POINTS

YEAR	YOU	GUT	A	B	CARD	WITH
LOW POWER	AL				-0.04	LM
HIGH POWER	AE				-0.06	LM
						0.00
						0.00

THIS PROGRAM RUN ON 29 SEP 1976

THIS IS SENSOR NUMBER 13

Figure 19. COMPUTE SENSOR ERROR program output (part 26).

ERRORS AS A FUNCTION OF BEARING

PER 999A ABC JOAN CATHERINE SS 9999 DATE: 12/25/76 FORACS 7 REPORT NO 888, FIELD 74
17 888742 PER 999A ABC 9

RANGE				BEARING				RANGE				BEARING			
NUMB	AVG	SD	CONF	NUMB	AVG	SD	CONF	NUMB	AVG	SD	CONF	NUMB	AVG	SD	CONF

Figure 19. COMPUTE SENSOR ERROR program output (part 27).

LISTING OF ERROR STATISTICS AS A FUNCTION OF BEARING

PER 999A ABC JUAN CATHERINE SS 9999 DATE: 12/25/76 FIDALS 7 KIPINT NO 888, FIELD 74

17 888742 PER 999A ABC 9

BEARING ERROR PARAMETERS ARE IN

* MINUTES *

BEARING ERRORS RANGE ERRORS

PEAK-TO-VALLEY VARIATION (PVV)

MIDPOINT OF PVV (MP)

AVERAGE STANDARD DEVIATION (ASD)

PEAK

VALLEY

MAXIMUM MEAN ERROR (RME)

AVERAGE STANDARD DEVIATION

TOTAL NUMBER OF DATA POINTS

OVERALL MEAN

OVERALL STANDARD DEVIATION

MEDIAN OF ERRORS

NUMBER OF VALID INTERVALS

HEIGHTED AVERAGE STANDARD DEVIATION

AVERAGE OF VALID INTERVAL MEANS

AVERAGE OF VALID INTERVAL ABSOLUTE MEANS

MEAN OF ABSOLUTE ERRORS

FOR PERISCOPE CALIBRATION, A VALID INTERVAL IS ONE WITH A MINIMUM OF THREE DATA POINTS

FOR THIS PERISCOPE CALIBRATION AND THE PRECEDING ONE, THESE VALUES ARE OBTAINED

ALIGNMENT ERROR (AE)

LOST MOTION (LM)

DEGREES MINUTES

-0.05 -2.75

0.07 4.10

THIS PROGRAM RUN ON 29 SEP 1976

THIS IS SENSOR NUMBER 14

Figure 19. COMPUTE SENSOR ERROR program output (part 28).

FORACS 7 REPORT NO 888, FIELD 81

DATE: 12/25/76

6666

SS

JOAN CATHERINE

PEL ALID 999 99

PEL ALID 999 99

17 888812

RANGE ERRORS

BEARING	NUMB	AVG	SD	CONF	NUMB	AVG	SD	CONF
185 TO 195	4	-0.72	0.15	0.15	4	-0.72	0.15	0.15
195 TO 205	9	-0.65	0.14	0.09	9	-0.65	0.14	0.09
205 TO 215	7	-0.68	0.13	0.10	7	-0.68	0.13	0.10
215 TO 225	5	-0.64	0.13	0.12	5	-0.64	0.13	0.12
225 TO 235	6	-0.61	0.05	0.04	6	-0.61	0.05	0.04
235 TO 245	7	-0.48	0.17	0.13	7	-0.48	0.17	0.13
245 TO 255	13	-0.61	0.15	0.08	13	-0.61	0.15	0.08
255 TO 265	3	-0.58	0.06	0.07	3	-0.58	0.06	0.07
265 TO 275	8	-0.60	0.13	0.09	8	-0.60	0.13	0.09
275 TO 285	9	-0.62	0.14	0.09	9	-0.62	0.14	0.09
285 TO 295	8	-0.61	0.18	0.13	8	-0.61	0.18	0.13
295 TO 305	17	-0.67	0.10	0.05	17	-0.67	0.10	0.05
305 TO 315	12	-0.63	0.11	0.06	12	-0.63	0.11	0.06
315 TO 325	6	-0.61	0.18	0.14	6	-0.61	0.18	0.14
325 TO 335	17	-0.51	0.14	0.07	17	-0.51	0.14	0.07
335 TO 345	12	-0.50	0.07	0.04	12	-0.50	0.07	0.04
345 TO 355	8	-0.39	0.17	0.12	8	-0.39	0.17	0.12
355 TO 5	10	-0.39	0.10	0.06	10	-0.39	0.10	0.06

LISTING OF ERROR STATISTICS AS A FUNCTION OF BEARING
 PEL ALID 999 99 JUAN CATHERINE SS 9999 DATE: 12/25/76 FOKACS 7 REPORT NU 809, FIELD 81
 17 008812 PEL ALID 999 99

PURT PELORUS

BEARING ERROR PARAMETERS ARE IN

 * DEGREES *

	BEARING ERRORS	RANGE ERRORS
PEAK-TO-VALLEY VARIATION (PVV)	0.34	0.0
MIDPOINT OF PVV (MP)	-0.55	0.0
AVERAGE STANDARD DEVIATION (ASD)	0.13	0.0
PEAK	-0.39	0.0
VALLEY	-0.72	0.0
MAXIMUM MEAN ERROR (MME)	-0.72	0.0
AVERAGE STANDARD DEVIATION	0.13	0.0
TOTAL NUMBER OF DATA POINTS	161	0
OVERALL MEAN	-0.58	0.0
OVERALL STANDARD DEVIATION	0.15	0.0
MEDIAN OF ERRORS	-0.58	0.0
NUMBER OF VALID INTERVALS	17	0
WEIGHTED AVERAGE STANDARD DEVIATION	0.13	0.0
AVERAGE OF VALID INTERVAL MEANS	-0.58	0.0
AVERAGE OF VALID INTERVAL ABSOLUTE MEANS	0.58	0.0
MEAN OF ABSOLUTE ERRORS	0.58	0.0

A VALID INTERVAL IS DEFINED AS HAVING AT LEAST FOUR DATA POINTS

THIS PROGRAM RUN ON 29 SEP 1976

THIS IS SENSOR NUMBER 15

Figure 19. COMPUTE SENSOR ERROR program output (part 30).

PEL ALID 999 99 JOAN CATHERINE SS 9999 DATE: 12/25/76 FORACS 7 REPORT NO 888, FIELD 82
17 888822 PEL ALID 999 99

BEARING	RANGE			BEARING			ERRORS		
	NUMB	AVG	SD	CONF	NUMB	AVG	SD	CONF	
185 TO 195									
195 TO 205									
205 TO 215									
215 TO 225									
225 TO 235									
235 TO 245									
245 TO 255									
255 TO 265									
265 TO 275									
275 TO 285									
285 TO 295									
295 TO 305									
305 TO 315									
315 TO 325									
325 TO 335									
335 TO 345									
345 TO 355									
355 TO 5					2	-0.20	0.28	0.39	
5 TO 15					12	-0.44	0.14	0.08	
15 TO 25					4	-0.60	0.12	0.12	
25 TO 35					4	-0.43	0.09	0.09	
35 TO 45					9	-0.24	0.17	0.11	
45 TO 55					13	-0.26	0.14	0.08	
55 TO 65					8	-0.34	0.19	0.13	
65 TO 75					12	-0.24	0.15	0.09	
75 TO 85					11	-0.18	0.07	0.04	
85 TO 95					7	-0.24	0.11	0.08	
95 TO 105					7	-0.30	0.23	0.17	
105 TO 115					11	-0.21	0.10	0.06	
115 TO 125					4	-0.26	0.05	0.05	
125 TO 135					5	-0.13	0.14	0.12	
135 TO 145					8	-0.24	0.12	0.08	
145 TO 155					9	-0.28	0.19	0.12	
155 TO 165					2	-0.31	0.06	0.08	
165 TO 175					1	-0.37	0.00	0.00	
175 TO 185									

Figure 19. COMPUTE SENSOR ERROR program output (part 31).

LISTING OF ERROR STATISTICS AS A FUNCTION OF BEARING
 PEL ALID 999 99 JUAN CATHERINE SS 9999 DATE: 12/25/76 FURALS 7 REPORT NO 888, FIELD 82
 17 H40022 PEL ALID 999 99

STARBOARD PELORUS

 BEARING ERROR PARAMETERS ARE IN * DEGREES *

	BEARING ERRORS	RANGE ERRORS
PEAK-TO-VALLEY VARIATION (PVV)	0.31	0.0
MIDPOINT OF PVV (MP)	-0.29	0.0
AVERAGE STANDARD DEVIATION (ASD)	0.14	0.0
PEAK	-0.13	0.0
VALLEY	-0.44	0.0
MAXIMUM MEAN ERROR (MME)	-0.44	0.0
AVERAGE STANDARD DEVIATION	0.14	0.0
TOTAL NUMBER OF DATA POINTS	129	0
OVERALL MEAN	-0.27	0.0
OVERALL STANDARD DEVIATION	0.16	0.0
MEDIAN OF ERRORS	-0.26	0.0
NUMBER OF VALID INTERVALS	12	0
WEIGHTED AVERAGE STANDARD DEVIATION	0.14	0.0
AVERAGE OF VALID INTERVAL MEANS	-0.28	0.0
AVERAGE OF VALID INTERVAL ABSOLUTE MEANS	0.28	0.0
MEAN OF ABSOLUTE ERRORS	0.28	0.0

A VALID INTERVAL IS DEFINED AS HAVING AT LEAST FOUR DATA POINTS

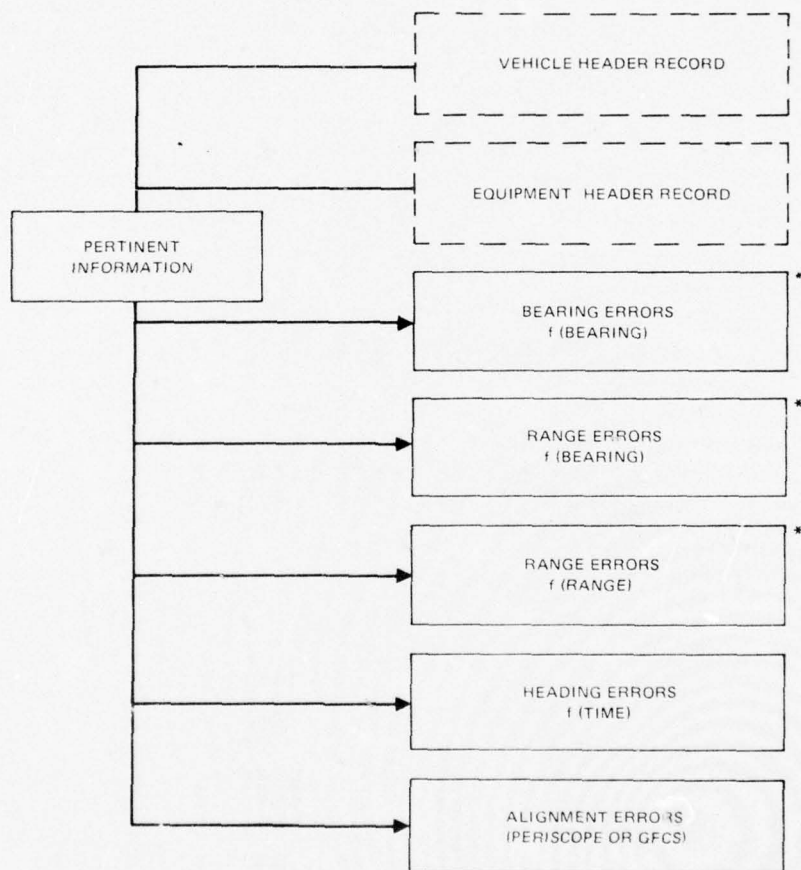
THIS PROGRAM RUN ON 29 SEP 1976

THIS IS SENSOR NUMBER 16

Figure 19. COMPUTE SENSOR ERROR program output (part 32).

SUMMARY DATA BANK PROGRAM

The input to this program is the data tape of the COMPUTE SENSOR ERROR program. The program skips the sectored output and transfers selected information from vehicle and equipment header cards to the summarized data records (fig 20). The information transferred by this program consists of the records shown in table 19. Statistical information contained in this data bank includes number of marks, mean or bias, standard deviation, median, peak-to-valley variation, midpoint, average standard deviation, and maximum error. The information shown in table 19 is added to the records shown as tables 13 through 18.



*THESE HAVE THE FOLLOWING
STATISTICAL VALUES

- NUMBER OF DATA MARKS
- MEAN OR BIAS
- STANDARD DEVIATION
- MEDIAN
- PEAK-TO-VALLEY VARIATION
- MIDPOINT
- AVERAGE STANDARD DEVIATION
- MAXIMUM ERROR

Figure 20. SUMMARY DATA BANK program output.

TABLE 19. SUMMARY DATA BANK CARD PUNCHING.

Column	Data	Remarks
GYRO ERROR		
65	Type test (ie, WSAT)	Column 78 of Vehicle Header Card
72-80	Equipment designation	Columns 43-42 of Equipment Header Card
BEARING ERROR		
65	Type test	Column 78 of Vehicle Header Card
66	Mode	Sonar or GFCS operational mode. R = RDT 0 = ODT, etc for sonar, T = auto, M = manual, etc for GFCS
67	Modification change	Sonar
68-70	Range scale	In hundreds of yards
71	Adjustment code	Column 71 of Equipment Header Card
72-80	Equipment designation	Columns 34-42 of Equipment Header Card
(Submarine Sonar only)		
72-79	Equipment designation	Columns 30-37 of Equipment Header Card
80	Mode	A = active, P = passive
(ESM only)		
66-67	Equipment designation	Columns 30-31 of Equipment Header Card
RANGE ERROR		
65	Type test	Column 78 of Vehicle Header Card
66	Mode	Sonar or GFCS operational mode. R = RDT. 0 = ODT, etc for sonar; T = auto, M = manual, etc for GFCS
67	Modification change	Sonar
68-70	Range scale	Hundreds of yards
71	Adjustment code	Column 71 of Equipment Header Card
72-80	Equipment designation	Columns 34-42 of Equipment Header Card
(Submarine Sonar only)		
72-79	Equipment designation	Columns 30-37 of Equipment Header Card
80	Mode	A = active, P = passive, T = two track From column 49 of Equipment Header Card

TABLE 19. (Continued)

Column	Data	Remarks
PERISCOPE ALIGNMENT AND LOST MOTION		
65	Type test	Column 78 of Vehicle Header Card
72-80	Equipment designation	Columns 31-42 of Equipment Header Card
PERISCOPE BENCHMARK ALIGNMENT		
65	Type test	Column 78 of Vehicle Header Card
72-80	Equipment designation	Columns 34-42 of Equipment Header Card
GUN FIRE CONTROL BENCHMARK CHECKS		
65	Type test	Column 78 of Vehicle Header Card
66	Mode	
72-80	Equipment designation	Columns 34-42 of Equipment Header Card

LIST AND PLOT PROGRAM

This program is used to generate listings and plots for summary reports. It makes use of a deck of control cards for each equipment to identify data to be selected, to provide title and/or heading information, to list performance standards for the equipment, and to provide formatting information for printing and plotting. Figure 21 is a sample listing and figure 22 are sample plots.

The cumulative graphs show the data for the current period plotted as individual points, and the background data plotted as a line segment. The abscissa is a continuous scale representing one of the error parameters. The ordinate is a continuous scale representing cumulative percentage (ie, the parameter having the largest magnitude falls at one hundred percent on the ordinate).

The modified bar graphs show the data for the current period plotted as individual points, and the background data plotted as vertical bars. As before, the abscissa represents one of the error parameters, but is broken into discrete intervals. For the background data, the ordinate is a continuous scale representing percentage. A vertical bar plotted over an interval shows the percentage of background data falling in that interval. For current period data, the ordinate is broken into discrete points, and is dimensionless. Each point plotted over an interval represents one error value falling in that interval.

TYPE TYPE SONAR 10.0 K RANGE SCALE PLOT TITLE IS TYPE 4

SUNAR TYPE, SUNAR READOUT, SONAR MODE - BEARING DATA

RANGE REPORT	SHIP NAME	CLASS	NUMB	INTERIM STANDARD FOR THIS SENSOR IS			PVV	PASSED	CUML	SEQUENCED
				2.50	2.5	3				
1	639	ANY SHIP	HULL NO. (P)	1.60	1.6	2	IN	IN	1.19	1.19
5	159	ANY SHIP	HULL NO. (A)	1.24	1.2	1	IN	IN	1.24	1.24
				1.97	2.0	2	IN	IN	1.32	1.32
2	555	ANY SHIP	HULL NO. (A)	1.68	1.7	2	IN	IN	1.47	1.47
1	636	ANY SHIP	HULL NO. (P)	1.47	1.5	2	IN	IN	1.60	1.60
1	639	ANY SHIP	HULL NO. (P)	1.19	1.2	1	IN	IN	1.48	1.48
1	645	ANY SHIP	HULL NO. (P)	2.44	2.4	2	IN	IN	1.72	1.72
3	313	ANY SHIP	HULL NO. (P)	1.75	1.8	2	IN	IN	1.91	1.91
				2.47	2.5	3	IN	IN	2.44	2.44
1	637	ANY SHIP	HULL NO. (P)	1.32	1.3	1	IN	IN	2.47	2.47

AVERAGE OF NEW DATA 1.71 NUMBER OF POINTS IS 10
 AVERAGE OF OLD DATA 1.84 NUMBER OF POINTS IS 40
 OVERALL AVERAGE 1.81 NUMBER OF POINTS IS 50

NEW DATA SUMMARY OLD DATA

10 SYSTEMS CHECKED 40
 10 NUMBER IN 36
 0 NUMBER CUT 4
 100 PERCENT IN 90
 0 INVALID POINTS 0

CUMULATIVE RESULTS

10 SYSTEMS CHECKED 40
 10 NUMBER IN 36
 0 NUMBER CUT 4
 100 PERCENT IN 90
 0 INVALID POINTS 0

Figure 21. LIST AND PLOT listing (part 1).

TYPE TYPE SONAR 10.0 K RANGE SCALE PLOT TITLE IS TYPE 5

SUNAR TYPE, SUNAR READOUT, SUNAR MODE - BEAKING DATA

RANGE REPORT	SHIP	NAME	CLASS	NUMB	STANDARD FOR THIS SENSOR IS			MID PMV	PASSED	CURL	SEQUENCED
					0.40	0.4	0				
1	639	ANY SHIP	HULL NO.	(P)	0.05	0.1	0		IN	IN	0.91
5	159	ANY SHIP	HULL NO.	(A)	-0.34	-0.3	-0		IN	IN	0.05
					-0.17	-0.2	-0		IN	IN	0.17
2	555	ANY SHIP	HULL NO.	(A)	1.36	1.4	1		OUT	OUT	0.17
1	636	ANY SHIP	HULL NO.	(P)	0.29	0.3	0		IN	IN	0.29
1	638	ANY SHIP	HULL NO.	(P)	0.35	0.4	0		IN	IN	0.29
1	643	ANY SHIP	HULL NO.	(P)	0.25	0.3	0		IN	IN	0.34
3	313	ANY SHIP	HULL NO.	(P)	-0.63	-0.6	-1		OUT	OUT	0.35
					-0.31	-0.3	-0		IN	IN	0.63
1	637	ANY SHIP	HULL NO.	(P)	0.17	0.2	0		IN	IN	1.36

AVERAGE OF NEW DATA 0.13 NUMBER OF POINTS IS 10

AVERAGE OF OLD DATA 0.18 NUMBER OF POINTS IS 40

OVERALL AVERAGE 0.17 NUMBER OF POINTS IS 50

NEW DATA SUMMARY OLD DATA

10 SYSTEMS CHECKED 40
 2 NUMBER IN 20
 2 NUMBER OUT 20
 50 PERCENT IN 50
 0 INVALID POINTS 0

CUMULATIVE RESULTS

10 SYSTEMS CHECKED 40
 8 NUMBER IN 20
 2 NUMBER OUT 20
 50 PERCENT IN 50
 0 INVALID POINTS 0

Figure 21. LIST AND PLOT listing (part 2).

TYPE TYPE SONAR 10.0 K RANGE SCALE PLOT TITLE IS TYPE 6
 SONAR TYPE, SONAR HEADOUT, SONAR MODE - BEARING DATA

RANGE REPORT	SHIP NAME	CLASS	NUMB	INTERIM STANDARD FOR THIS SENSOR IS	AVG STD	1	PASSED	CUML	SEQUENCED
				0.70	0.7	---			
1 639	ANY SHIP	HULL NO.	(P)	0.55	0.6	1	IN	IN	0.38
5 159	ANY SHIP	HULL NO.	(A)	0.40	0.4	0	IN	IN	0.39
				0.38	0.4	0	IN	IN	0.40
2 555	ANY SHIP	HULL NO.	(A)	0.55	0.6	1	IN	OUT	0.48
1 636	ANY SHIP	HULL NO.	(P)	0.48	0.5	1	IN	IN	0.48
1 638	ANY SHIP	HULL NO.	(P)	0.60	0.6	1	IN	IN	0.48
1 643	ANY SHIP	HULL NO.	(P)	0.56	0.6	1	IN	IN	0.55
3 513	ANY SHIP	HULL NO.	(P)	0.39	0.4	0	IN	OUT	0.55
				0.48	0.5	1	IN	IN	0.56
1 637	ANY SHIP	HULL NO.	(P)	0.48	0.5	1	IN	IN	0.60

AVERAGE OF NEW DATA 0.49 NUMBER OF POINTS IS 10
 AVERAGE OF OLD DATA 0.51 NUMBER OF POINTS IS 40
 OVERALL AVERAGE 0.50 NUMBER OF POINTS IS 50

NEW DATA SUMMARY OLD DATA

10 SYSTEMS CHECKED 40
 10 NUMBER IN 39
 0 NUMBER OUT 1
 100 PERCENT IN 98
 0 INVALID POINTS 0

CUMULATIVE RESULTS

10 SYSTEMS CHECKED 40
 6 NUMBER IN 20
 2 NUMBER OUT 20
 80 PERCENT IN 50
 0 INVALID POINTS 0

Figure 21. LIST AND PLOT listing (part 3).

TYPE 4 1

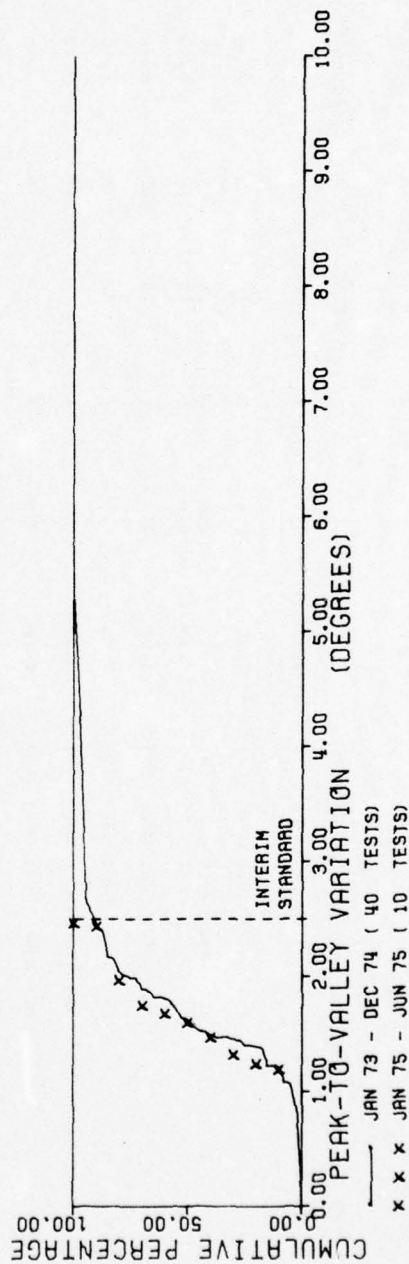
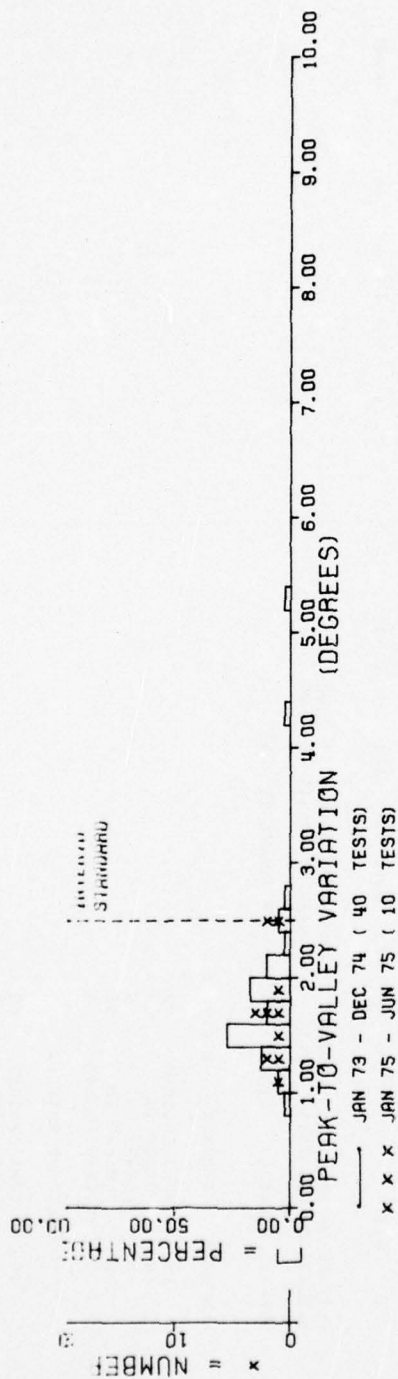


Figure 22. LIST AND PLOT sample plots (part 1).

TYPE 5 2

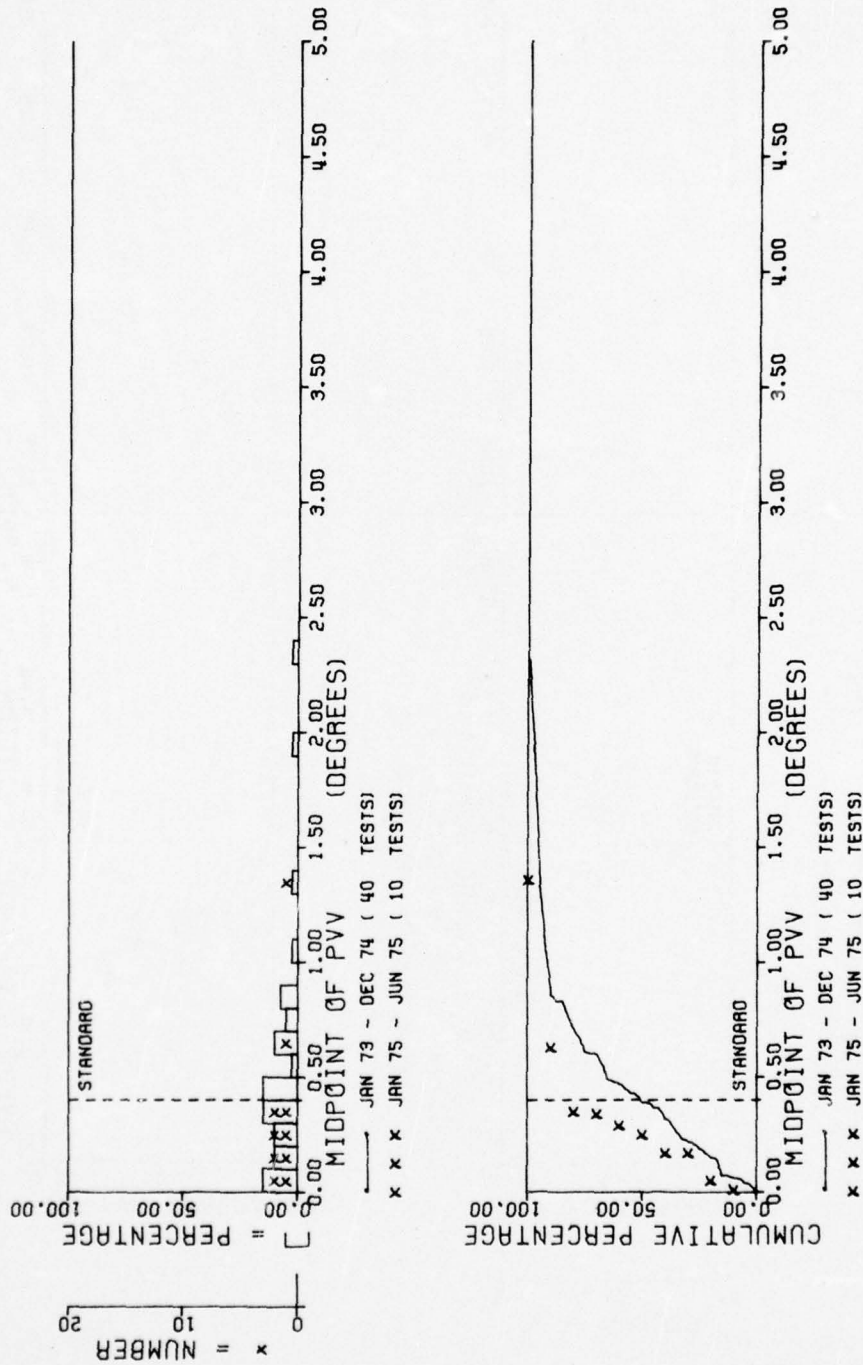


Figure 22. LIST AND PLOT sample plots (part 2).

TYPE 6 3

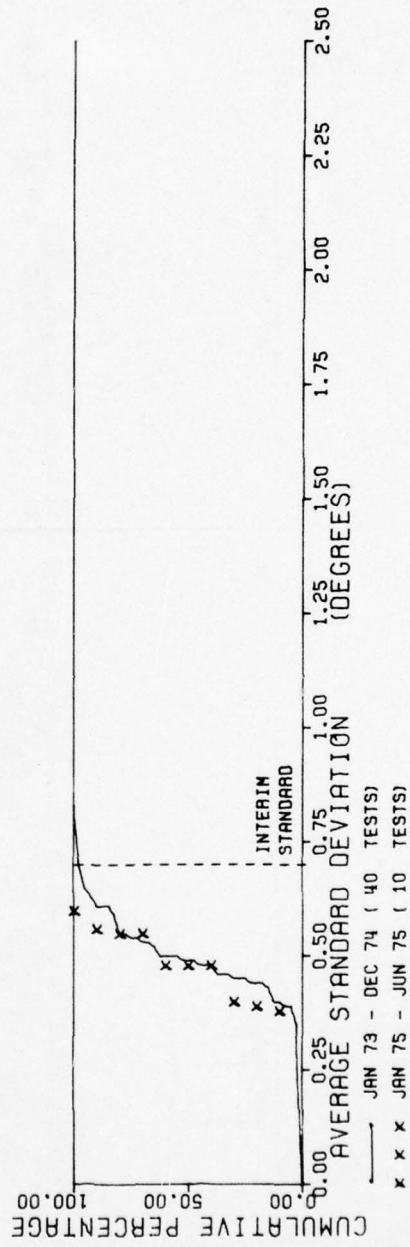
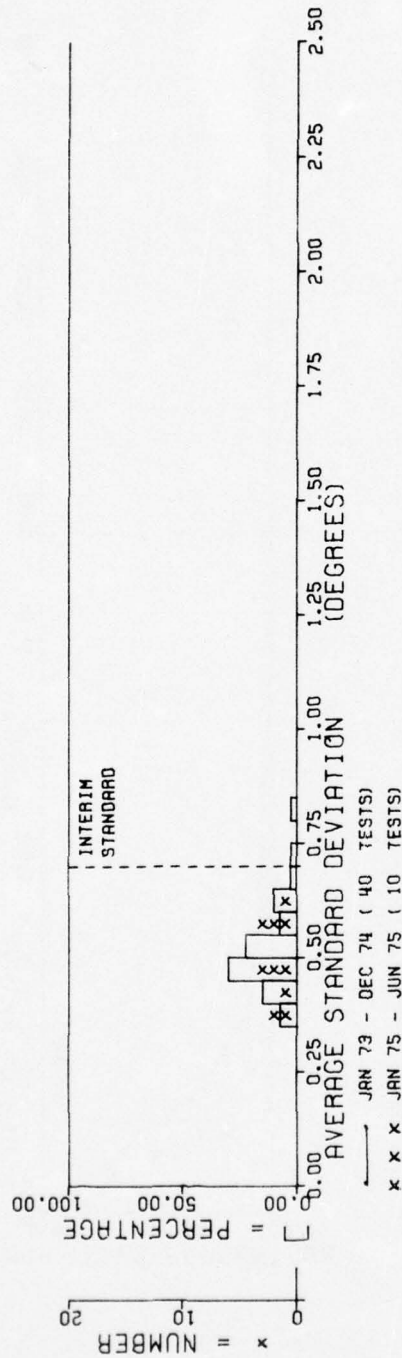


Figure 22. LIST AND PLOT sample plots (part 3).

OTHER PROGRAMS

Other programs in the NELC FORACS library include those that can regenerate any plot, list any portion of any tape, and extract information from vehicle header cards to generate a file of range activity. Other information which can be extracted includes data on selected ships, particular sensors, and range activity by period. Sorts may be made by country and any information on vehicle or equipment header records can be transferred to tape for further analysis. Another program used for analysis is the "COMPOSITE CURVE" program.

COMPOSITE CURVE PROGRAM

For each ten-degree bearing sector of each sensor the sensor data bank contains the number of error samples, the sum of these errors, and the sum of the squared errors. From these data, a mean and standard deviation for each bearing sector may be computed.

The COMPOSITE CURVE program permits the combined processing of many sensors to compute a single mean and standard deviation for each ten-degree bearing sector. This program outputs a listing and a plot for each set of sensors which are processed. The listing identifies each sector, the total number of points in the sector, the mean error for the sector and the standard deviation of the data in that sector. The plot shows the mean of each sector and the plus or minus one standard deviation value plotted about the mean. Figure 23 is a sample listing and figure 24 is a sample plot.

SEC TOR	NUMBER	AVERAGE	STD. DEV.
-170	0	0.00	0.00
-160	0	0.00	0.00
-150	0	0.00	0.00
-140	7	2.41	1.54
-130	11	-0.15	0.21
-120	53	0.21	0.75
-110	139	0.37	0.92
-100	136	0.58	0.72
-90	124	0.50	0.87
-80	120	0.45	0.90
-70	131	0.50	0.93
-60	121	0.43	0.97
-50	125	0.45	0.85
-40	150	0.48	0.75
-30	117	0.31	0.71
-20	148	0.34	0.77
-10	183	0.50	0.75
0	232	0.46	0.77
10	155	0.47	0.69
20	140	0.53	0.80
30	137	0.45	0.72
40	141	0.46	0.96
50	146	0.61	1.04
60	147	0.61	1.00
70	142	0.51	0.85
80	148	0.66	0.80
90	130	0.57	0.81
100	125	0.42	0.87
110	154	0.56	0.81
120	66	0.71	0.83
130	13	0.19	0.44
140	13	-2.26	0.74
150	0	0.00	0.00
160	0	0.00	0.00
170	0	0.00	0.00
180	0	0.00	0.00

Figure 23. COMPOSITE CURVE plot listing.

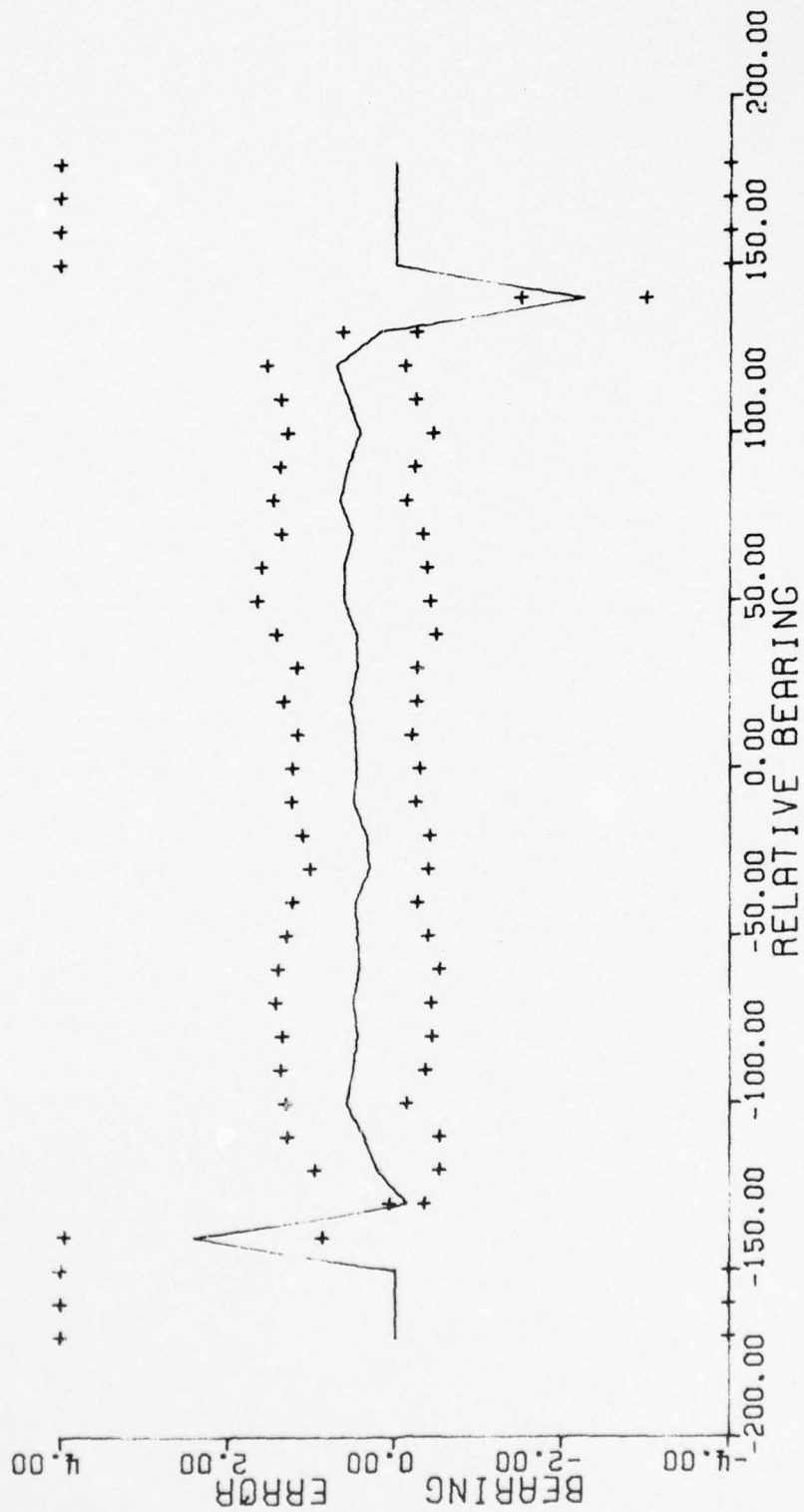


Figure 24. COMPOSITE CURVE plot.

END
2-77